TRAFFIC(U.S.A.)

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THE SHELL TRADE IN FLORIDA

STATUS, TRADE, AND LEGISLATION

by

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October 1980

SPECIAL REPORT 3

TRAFFIC (Trade Records Analysis of Flora and Fauna In Commerce) is a Specialist Group of the Survival Service Commission of the International Union for Conservation of Nature and Natural Resources. Its function is to monitor the international trade in wildlife on behalf of the Survival Service Commission.

WORLD WILDLIFE FUND-U.S. | TRAFFIC(U.S.A.) is funded by the World Wildlife Fund - U.S.

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I. INTRODUCTION

This survey of the nature and extent of the shell trade in Florida and, to a lesser extent elsewhere in the United States, was made because of the continuing concern and interest by many groups in the use and exploitation of the molluscan natural resources of the world's seas. In particular, conservationists mainly familiar with the problems besetting endangered birds, mammals, and reptiles, have been alarmed at the large amounts of seashells being harvested and sold throughout the world, and in particular, in the state of Florida. Many people ask, "Is man over-collecting shells and destroying the ecology and threatening the existence of many marine species of invertebrates?".

Man's pressure on the world's populations of mollusks have always existed since his rise to dominance in the world's biosystem. Mollusks, next to fish and crustacea, are one of the major oceanic sources of food and other commercial products, such as oysters, clams, scallops, pearls, seashells, squid as food and bait, and cuttlefish bones. Shell-collecting, although a relatively minor contributor to the harvesting of mollusks, has been a popular hobby for many generations, and is now enjoying a popularity similar to that during the Victorian "golden age of natural history."

This survey describes the nature and extent of the shell trade in Florida. It shows what species of shells are being imported and sold, how they are being used, where they come from, and reports on the commercial volume. If certain species are being threatened by over-collecting, this report points out the potentially threatened species, and the rate at which they are being sold to the consumer. There are about 5,000 kinds of shells, out of the 40,000-or-so known, that are large enough to be saleable.

To a lesser degree, this report makes observations on the sale of corals in shell shops. Corals, to a lesser extent than shells, are becoming a popular source for attractive decorations in the home and in aquaria. Black and precious red corals are being used extensively in the jewelry business. The increasing quantities seen for sale in numerous retail tourist shops has prompted inquiries as to the potential long-range effect this might have on world coral reefs and underwater habitats. Because two excellent and competent surveys have recently been made (Johannes, 1978; Zangri, et al, 1979), this survey and report deals only superficially with the coral situation.

Personal interviews were made in Florida with several dozen retail and wholesale shell dealers, with professional shell collectors, fisheries officers, and members of Florida's Natural Resources Department. A questionnaire was mailed to 201 Florida shell dealers and the results are tabulated from the 80 responses. Inventories of 30 shell shops were made and remarks and observations are recorded concerning the nature of the species, their abundance, geographical sources and prices (See Appendix 1).

This report does not offer any new information regarding the impact of the use of shells on the ecology and health of mollusk populations. This would require expert biological investigation by competent malacologists in the natural areas where most of the mollusks are being collected, such as the Philippines, Mexico, Haiti, Taiwan, India, and Japan, and, to a lesser extent, in Florida.

II. MAN'S USE OF MOLLUSKS - A HISTORIC REVIEW

Since prehistoric times man has used mollusks extensively for many purposes. Graves and the kitchen middens of primitive peoples attest to the use of land, freshwater and marine shells as a major source of food and object of adornment and decoration among the early inhabitants of Eurasia and the Americas. Much later, as human populations and the complexities of civilization increased, the amount and nature of the uses of mollusks have grown extensively.

Food has been the main contribution from mollusks, with clams, oysters, mussels, scallops, abalone, and squid being the leading sources. The annual world commercial production of mollusk meat from marine bivalves and snails has for the last ten years remained at about 1 billion kg (FAO, 1976). Cuttlefish and squid account annually for about another 20 million kg (FAO, 1976). A very large unknown amount of mollusks are collected and eaten by seaside villagers and sport fishermen throughout the world.

The shells of mollusks and corals have been used for centuries for various purposes, ranging from personal adornment, jewelry, decorations, and shell collections to floor inlays and roadbed material. Cowrie shells were used exclusively for currency for centuries in China, and during the zenith of the use of these small shiny gastropods in Africa during the 1860s and 1870s, it is estimated that a billion cowries (Cypraea) were collected annually in the East Indies and the Indian Ocean. Natural pearls and mother-of-pearl articles also reached their zenith of use during the Victorian period. Many millions of tons of Trochus top snails, Pinctada pearl shells, and freshwater mussels (Unionidae) were imported annually into England. No less

than 5,000 persons were employed in Birmingham for the sole purpose of manufacturing cutlery handles from pearl oysters (Boss, 1969). About 300,000 conch shells (Strombus gigas) were annually imported into Liverpool from the Bahamas for the manufacture of fine porcelain (Boss, 1969).

Pearls, of course, are a well-known product of mollusks, and the use of them and the pearl oyster has a long and fascinating history. The development and production in Japan of the cultured pearl during the 1930s greatly reduced the use of natural pearls. The art of cameo carving in helmet shells (Cassis), conchs (Strombus gigas), and several cowries (Cypraea tigris) especially became popular in the early 1800s in Italy and by the middle of the century was a small industry in France and Austria, employing over 5,000 cameists (Ritchie, 1974). Untold millions of red helmets (Cypraecassis rufa) were collected in East Africa and shipped to southern Europe. The industry has had a recent revival, despite the advent of plastic cameos. Freshwater pearly mussels from the rivers of the central United States are shipped at the present annual rate of about 3 million kg to Japan (Table 9), where they are cut into shell beads to be inserted in live pearl oysters for a final pearlizing finish.

Mollusks have medical importance and many other economic and scientific uses. Some freshwater species carry parasitic diseases that are annually responsible for over 200,000 human deaths in Africa, Asia, and parts of South America (Mackie, Hunter, & Worth, 1954; Abbott, 1947). Mollusks are used to detect pollution, locate oil, trace ancient trade routes, outline former geological boundaries, and in medical and biological research. Their shells are used as home decorations, in religious ceremonies in certain parts of the world, and are used extensively in hobby collecting and as souvenirs in coastal areas.

III. U.S. IMPORT AND FOREIGN TRADE

A. U.S. Imports

Imports of non-edible parts of mollusks, their shells, pearls, and precious and stony corals amounted in 1979 to a total value of $55,761,868 (see below). This total does not include $15,034,719 worth of Abalone (Haliotis) meat imported in 1979 (Table 8), and from which shells are a secondary product. The following import figures are taken from U.S. Import for Consumption (IM 146), U.S. Customs Service statistics compiled by the Bureau of Census, U.S. Department of Commerce, with imports divided into six categories, arranged below according to the percent of the total import value.

1.	Cultured Pearls	$39,655,487	71%
2.	Articles Made of Shells	7,029,406	12%
3.	Precious red coral, cameos	3,510,812	6%
4.	Crude shells in bulk	4,882,428	9%
5.	Crude Stony Coral	430,138	1%
6.	Cuttlefish bone	253,597	1%
	TOTAL	$55,761,868	100%

To the above U.S. Customs figures should be added an estimated national value of $1,200,000 for specimen shells imported through the mail and couriers mainly by mail-order shell dealers, a few retail shops, and many private collectors (Author's estimate from interviews with dealers).

The United States has imported over the last 18 years an average of 3.6 million kg of shells and 320,000 kg of coral per year. The total weights of imported shells is relatively small compared to that of the shells harvested around the world for food purposes. As an example,

Doran (1958) reports about 1.4 million kg of the meat of the pink conch (Strombus gigas) being exported annually from Caicos to Haiti. J. Randall (1963) and J. Boss (1969) report that the equivalent of 225,000 kg of conch meat is harvested annually in the Bahamas. These two figures amount to about 3.6 million kg of shells. Similar figures for the Chank Shell (Turbinella pyrum) of India, and the Knobbed Whelk (Busycon) of eastern United States would indicate that tens of millions of kilograms of other gastropods are harvested for food purposes, and that the amount of crude and finished shells brought into the United States is a very small percentage of the world population of shells.

In the last 20 years the quantity of shells imported annually has doubled. To what extent this has affected the local ecology of the molluscan habitats or the health of the mollusk populations cannot be estimated until detailed surveys are made of the habitats where the shells were collected.

B. Exporting Countries

For the last 20 years, the main source of seashells has usually been the Philippines (Table 1), primarily because of the malacological richness of that vast archipelago of 2,000 islands, relatively cheap labor, and adequate business and shipping facilities. Japan, Australia, Haiti, and Mexico are secondary suppliers, usually exporting about half to one third the capacity of the Philippines. From 1977 to 1979, Mexico was the second largest exporter mainly because of the stepped-up offshore fishing for Murex, rock shells, olives (Oliva), Strombus conchs, and the abalone (author's observation). Reports in shell magazines and interviews with wholesalers would indicate that India and Taiwan are becoming major suppliers.

TABLE 1
U.S. IMPORTS OF CRUDE MARINE SHELLS
(in thousands of kg)

	Australia	Bahamas	Haiti	India	Japan	Kenya	Mexico	Philippines	Taiwan	Tanzania	United Kingdom	Other	Total Quantity (kg)	Total Value (US$)
1963	83.4	2.8	7.7		34.1		14.8	108.3			3.7	158.3	413.1	140,838
1964	173.2	74.5	8.1	4.0	82.2		117.0	357.8		10.1	17.0	380.0	1223.0	421,482
1965	152.4	88.5	16.6		61.9		38.8	264.2		99.7	17.5	59.0	798.8	322,883
1966	192.4	107.2	52.3		130.4	7.4	27.8	338.4		115.3	18.5	92.8	1082.5	372,729
1967	195.6	70.5	226.2		46.3	.9	84.7	453.9		124.8	17.6	130.1	1350.6	456,223
1968	198.7	75.3	407.0		69.9		45.9	407.0	3.0	95.5	13.1	116.6	1432.0	443,576
1969	188.5	13.6	371.3		27.9		126.7	333.5	3.1	61.1	5.0	19.5	1150.2	406,596
1970	120.1	12.9	524.5	.5	53.7	4.3	148.5	674.6	18.4	115.2	4.2	115.9	1792.8	537,248
1971	47.0	33.9	488.0		43.3	9.3	174.6	652.5	16.9	72.3		314.9	1852.3	497,704
1972	99.8	3.7	451.6	2.0	57.0	35.1	399.2	861.6	23.8	35.0	6.6	108.8	2084.2	754,050
1973	104.0	49.1	465.6	2.7	43.1	33.5	296.5	1085.9	47.4	54.4	27.3	391.8	2601.3	1,061,047
1974	110.0		526.1				757.7	1035.0	92.6			991.6	3513.0	1,613,000
1975	142.5		797.0				631.4	978.4	99.9			262.5	2911.7	1,884,000
1976	82.3		764.9	45.2	54.1	153.9	1137.0	1402.6	126.7	110.1		146.8	4023.6	3,073,000
1977	114.2		967.0	31.8		80.3	1652.0	1498.9	63.4			224.1	4631.7	2,973,000
1978	117.5	3.0	580.0	65.7	27.3	81.4	1674.3	1488.3	69.8	14.2	69.6	115.6	4306.9	4,033,547
1979	97.6	1.1	392.0	66.4	37.4	60.6	1790.9	1118.8	63.9	82.8	311.1	137.7	4160.3	4,882,428

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled by the Bureau of the Census, Department of Commerce.

According to U.S. importers, Japan and Australia are no longer the main sources of supply because of the reported restrictions on ornamental shell collecting in commercial quantities. Haiti's present prominence as a supplier is due to organized wholesalers on La Gonave Island where labor is cheap, jobs scarce, and shell collecting provides much-needed protein from the mollusks when they are cleaned. India's rise in shell exports is due to recently exploited, offshore beds of extensive populations of shell (Jonklaas, 1976).

Table 1 shows a gradual increase in foreign shell imports which has increased about four-fold over the last 15 years. It will also be noted that the average import value per kilogram for crude shells (not polished or used in manufactured items) has increased, standing at about $0.35 in the 1960s, rising to $0.50 in the mid-1970s, and jumping to over $1.10 in 1979. The increase in the relative cost of shells is probably a reflection of the general world monetary inflation.

As Table 2 indicates, most of the crude or bulk coral (most likely of the sclerachinian stony type) has come from the Philippines, with only small amounts occasionally being imported from the Bahamas (as in 1961-67), Haiti (as in 1973 and 1978), Honduras (as in 1978), Italy (as in 1969-70), and Taiwan (as in 1978 and 1979). Supplies of collectible and attractive corals are located mainly in the East Indies and especially the Philippines, with smaller amounts available in the Caribbean and Red Sea. U.S. imports have more than doubled over the last 20 years (Table 2). The average price of corals in the 1960s was about $0.25/kg; in the late 1970s, it was bringing about $0.90 (Table 2).

One of the most rapid increases in the shell trade has been in the importation of articles made of shells (Table 3). The value of these imports rose from about $300,000 in the early 1960s to over $7 million in the late 1970s. Again, the Philippines has led in this

TABLE 2

U.S. IMPORTS OF CRUDE CORAL
(in thousands of kg)

	Bahamas	Haiti	Honduras	Italy	Philippines	Taiwan	Thailand	Other	Total Quantity (kg)	Total Value (US$)
1960	6.9				195.4			15.9	218.2	30,941
1961	4.7			.1	152.6			8.8	166.2	46,065
1962	4.3			.1	224.7			1.3	230.4	53,003
1963	1.9			.1	121.8			.5	124.1	20,671
1964	.2				172.0			2.7	174.9	29,238
1965					80.3			11.5	91.8	26,325
1966	7.2				120.8			1.1	129.3	37,877
1967	17.3				151.7			6.9	175.9	41,349
1968					160.5			2.9	163.4	62,672
1969				2.8	176.2			23.5	202.5	61,745
1970				.1	116.8			11.0	127.9	50,746
1971	.6			.3	168.4	.04		16.5	185.9	88,271
1972	1.9			2.0	319.5	2.1		11.9	337.4	177,462
1973	10.3	17.1		.7	369.9			5.9	403.9	189,705
1974					251.0			61.1	312.1	159,000
1975				2.4	257.9			97.1	357.4	412,000
1976				1.9	555.1			120.8	667.8	563,000
1977				1.9	378.2			53.0	433.3	449,000
1978		11.6	15.3	.5	684.7	40.2		5.7	757.8	496,674
1979				2.8	330.7	11.0	2.3	1.8	348.6	430,138

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled by the Bureau of the Census, Department of Commerce.

TABLE 3

U.S. IMPORTS OF ARTICLES MADE OF SHELLS
(in thousands of dollars)

	Hong Kong	India	Italy	Japan	Korea	Mainland China	Mexico	Philippines	Taiwan	W. Germany	Other	Total Value (US$)
1963	46.7	.1	3.7	39.9				69.9	1.8	.8	2.6	165.7
1964	130.2		34.0	155.1				192.3	2.4	.5	9.5	524.0
1965	104.2		33.3	152.0			1.3	162.4		1.7	17.1	472.0
1966	64.8		29.0	190.1	4.5		1.2	215.0	4.6		13.3	522.1
1967	59.7		22.9	189.5	1.9			250.2	1.9		19.7	547.5
1968	80.8		18.4	225.2	5.2		1.0	380.6	8.8		21.4	741.6
1969	112.9	1.1	19.4	255.9	2.4		6.0	453.2	8.4	1.5	58.5	919.3
1970	119.0	3.2	22.1	269.0			4.1	317.5	11.0	14.7	46.0	806.6
1971	185.3	3.4	23.3	304.6	5.2		2.1	332.8	26.8	72.9	19.6	976.0
1972	291.0	4.5	11.7	435.9	15.3	31.5	11.5	560.6	40.3	103.9	19.5	1,525.7
1973	187.2	5.1	30.6	489.3	79.1	18.8	12.7	913.7	121.9	52.9	81.1	1,992.4
1974	94.0		81.0	370.0	85.0			1588.0	405.0	84.0	165.0	2,872.0
1975	119.0		62.0	362.0			89.0	6400.0	571.0	102.0	264.0	7,969.0
1976	78.0	67.0	62.0	356.0	212.0	67.0		6303.0	715.0	101.0	314.0	8,275.0
1977	71.0	88.0	69.0	346.0	210.0	76.0		4699.0	545.0	97.0	226.0	6,427.0
1978	98.9	118.3	43.1	234.3	226.8	143.8	168.9	4635.7	782.4	138.5	227.2	6,818.2
1979	117.1	166.7	45.4	173.9	353.0	120.7	140.9	4484.2	883.5	307.1	236.7	7,029.4

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled by the Bureau of the Census, Department of Commerce.

industry since 1964, doubtlessly due to its ready raw materials and cheap labor. Taiwan, Japan, Hong Kong, and Korea are secondary sources. These articles include shell-covered boxes, boats, dolls, animals, figurines, mirrors, chimes, lamp shades, place mats and a host of other souvenir items made of or decorated with shells.

Another major foreign source of sea life comes from the manufacture of polished precious coral, cameos from helmet shells (Cassis), and small mother-of-pearl carvings and trinkets made from large pearl oyster shells (Pinctada), top shells (Trochus), and turban shells (Turbo). These manufactured items are reported as a separate entry by the U.S. Customs Service, and U.S. imports are listed in Table 4. Italy leads in this export industry because of the manufacture of easily obtainable Mediterranean precious coral and shell cameos. According to U.S. dealers, in 1978, Taiwan became the primary exporter because of its production of pearl oyster and turban shell carvings and cut-outs. This has grown from a half million dollar export business in 1965 to over $4 million in the 1970s (Table 4). The production of these items depends on the fishing of wild pearl oysters, helmet shells, and turban shells.

U.S. imports of cultured pearls involves large volumes, and in 1979, the import value was about $40 million (Table 5). Japan exports account for 90% of the total value. The production of these pearls does not have a serious impact on the ecology of Japanese waters because they are formed in oysters grown on man-made rafts.

The import of Cuttlefish bone from the Sepia squid of the Mediterranean and Japan is relatively minor in comparison to that of cultured pearls (Table 6). Thay are used whole in bird cages to keep birds' beaks sharp or ground down as a toothpaste base. They are either a by-product of the squid fishery of washed ashore and collected.

TABLE 4

U.S. IMPORTS OF CORAL AND CAMEOS FOR JEWELRY
(in thousands of dollars)

	Cayman Islands	Hong Kong	Italy	Japan	Philippines	Taiwan	Tunisia	W. Germany	Other	Total Value (US$)
1963		.9	60.9	33.5					.6	95.9
1964		1.1	155.9	184.1				2.4	2.9	346.4
1965		16.3	287.7	179.6				1.4	16.4	501.4
1966		7.8	491.2	333.9		8.4		6.6	9.0	856.9
1967		13.0	654.4	499.2		11.3		4.0	24.2	1,206.1
1968		18.7	602.5	749.8		27.3		4.3	47.7	1,450.3
1969		9.6	748.3	731.1		78.2		4.9	59.0	1,631.1
1970		30.2	553.6	440.7		111.0		2.2	15.5	1,153.2
1971		39.6	520.6	334.2		110.8		50.9	24.8	1,080.9
1972		31.1	649.2	281.6		165.6		18.8	11.8	1,158.1
1973		66.9	1180.4	523.0		279.2		23.0	30.6	2,103.1
1974		80.0	2083.0	640.0		243.0			34.0	3,080.0
1975			4928.0	756.0	107.0	508.0			176.0	6,475.0
1976			3423.0	1226.0	68.0	1541.0			238.0	6,496.0
1977			1740.0	633.0	63.0	1708.0			212.0	4,356.0
1978	.9	38.7	1420.8	491.9	54.1	2162.2	1.1	18.7	98.3	4,286.7
1979	35.3	61.3	1425.2	296.4	46.0	1508.6	66.9	34.0	37.2	3,510.9

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled by the Bureau of the Census, Department of Commerce.

TABLE 5
U.S. IMPORTS OF CULTURED PEARLS
(in thousands of dollars)

	Australia	Burma	Hong Kong	India	Italy	Japan	Korea	Switzerland	United Kingdom	W. Germany	Other	Total Value (US$)
1963	13.2		5.8	3.9		4771.4		7.2			4.9	4,806.2
1964	56.9	19.1	52.8	15.3	3.4	19013.0		29.4	.6	3.9	10.1	19,204.5
1965	140.1	167.5	68.8	1.7	8.4	21045.8		136.8	31.9	12.9	60.6	21,674.4
1966	367.1	160.1	150.0	1.2	6.9	20351.2		50.3	14.3	19.9	115.2	21,236.1
1967	264.2	144.5		1.6	1.5	16511.7	1.3	5.6	6.1	1.9	201.8	17,140.2
1968	19.1	225.3	125.7		6.5	12321.5		92.1	40.7	2.0	31.9	12,864.8
1969	26.1	427.0	169.8	26.2		11273.0	1.1	234.1	17.3	1.5	62.2	12,238.3
1970	21.5	231.7	249.3	3.7	6.8	9616.9	4.0	22.8	1.8		25.3	10,183.8
1971	55.5	146.3	183.4	4.0	2.2	6454.4	22.4	15.5	3.8		7.2	6,894.7
1972	20.8	89.1	112.6	22.9	2.5	7267.4		67.6			32.4	7,615.3
1973	4.4	348.1	231.5	7.7	19.0	8374.9		166.1	6.4	8.1	65.7	9,231.9
1974		126.0	136.0			8481.0					131.0	8,874.0
1975			65.0			7027.0					169.0	7,261.0
1976		89.0	90.0			10590.0					293.0	11,062.0
1977		208.0	154.0			17620.0					320.0	18,302.0
1978	22.1	72.1	424.5	31.3		24567.4		417.9	13.0	16.2	1587.1	27,151.6
1979	33.4	254.7	634.9	35.9	25.2	36199.3	72.9	1060.9	34.0	56.9	1247.3	39,655.4

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled by the Bureau of the Census, Department of Commerce.

TABLE 6

U.S. IMPORTS OF CUTTLEFISH
(in thousands of kg)

	France	Ghana	India	Japan	Portugal	Spain	Taiwan	Thailand	Tunisia	Other	Total Quantity (kg)	Total Value (US$)
1964	19.4	.3	2.1	22.3	5.9	6.2	1.1		9.6	14.4	81.3	64,684
1965	11.8	6.5	10.8	13.1	6.9	45.8			5.9	5.2	106.0	79,925
1966	9.9	3.4	11.4	6.6	5.3	71.9			9.1	2.3	119.9	88,345
1967	11.6	2.3		4.0	2.7	67.2			7.1	5.4	100.3	75,746
1968	17.4	4.3	13.1	5.2	5.6	47.4			2.3	4.2	99.5	77,995
1969	17.3		13.0	3.0	4.5	46.7			1.8	5.0	91.3	69,573
1970	8.2		4.7	.9	10.5	44.2			4.3	27.2	100.0	67,786
1971	6.3	4.8	5.7	2.2	6.6	31.4				19.7	76.7	52,823
1972	20.5	11.5		13.6	5.7	40.8				13.7	105.8	92,666
1973	13.2	10.1	5.7	15.2	5.1	35.1	4.8		1.1	11.4	101.7	114,693
1974											56.9	67,000
1975											58.3	77,000
1976											96.7	149,000
1977							26.0			51.7	77.7	136,000
1978		1.6	10.3	32.3			32.2			3.6	80.0	188,458
1979			17.3	16.1			46.2	5.6			85.2	253,597

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled by the Bureau of the Census, Department of Commerce.

C. Foreign Mollusks Imported for Consumption

These statistics are given only because the catching and marketing of these mollusks often involve the use of the shell, either for the souvenir trade, as roadbed material, garden mulch, chicken feed additive, or other purposes. The fishing method used, be it digging, trawling, or dredging, probably has some impact on the ecology of local waters. The impact or extent of tearing up the bottom, disturbing natural beds of other invertebrates, and the silting of neighboring areas has been studied in only a few small areas by the shellfisheries industry and/or marine biologists. The decline of oyster production is reported to be due to oyster diseases and the decline in the quality of the inshore ocean water, partially because of the pollution from industrial and city wastes. Most live mussels and some fresh oysters and clams reach the consumer in the shell. However, scallops and many clams are shucked and the shells discarded or used as roadbed material, lime, or in the souvenir shell trade. In general, a kilogram of scallop meat comes from about 5 kg of scallop shells, while in the lighter-shelled Blue Mussels, a kilogram of meat represents only 100 grams of shell (FAO, 1976).

D. Land and Freshwater Shells

There are about 15,000 living species of land and freshwater mollusks in the world (Boss, 1971). Their economic importance, at least from a deleterious standpoint, is equal to that of the marine species which are major sources of food. There are about 40 species which are of medical importance, since they carry human parasitic diseases responsible for over 200,000 human deaths a year (Mackie, Hunter and Worth,

TABLE 7

VALUE OF U.S. IMPORTS OF FOREIGN MOLLUSKS FOR FOOD

	1973	1974	1975	Exporting Countries
Abalone fresh/frozen	$4,284,000	$9,349,000	$12,096,000	Australia, Japan, Mexico
Fresh Clams (incl. seed oysters)	$2,374,000	$1,817,000	$1,211,000	Canada, Japan, others
Canned Clams	$2,920,000	$4,102,000	$1,811,000	Hong Kong, Japan, others
Oysters fresh/frozen	$2,254,000	$2,287,000	$2,473,000	Japan, Korea, others
Oysters smoked	$3,053,000	$3,269,000	$3,527,000	Japan, Korea, others
Oysters canned	$2,798,000	$3,683,000	$1,518,000	Hong Kong, Japan, Korea
Scallops fresh/frozen	$33,625,000	$28,106,000	$37,183,000	Australia, Canada, Iceland, U.K.
TOTALS	$51,308,000	$50,796,000	$59,819,000	

Source: Food and Agriculture Organization of the United Nations, Fisheries Circular No. 345.

TABLE 8

U.S. IMPORTS OF ABALONE[1]
(in thousands of kg)

	Australia	Canada	Chile *	Japan	Mexico	Peru *	Rep. South Africa	Other	Total Quantity (kg)	Total Value (US$)
1963			8.8	12.3	1182.5		5.1		1200.7	1,365,258
1964	3.1	13.3		62.1	2860.2		5.7	4.0	2948.4	3,468,374
1965	29.6	.5		26.1	2660.2		2.2	5.5	2724.1	3,297,937
1966	66.5	2.1		35.4	2171.5		6.7	2.7	2284.9	2,843,597
1967	182.8			21.4	1717.0		3.1	.3	1924.6	2,471,144
1968	369.5			41.6	2015.7		15.7	19.7	2462.2	4,221,173
1969	221.8			24.0	2033.8		2.1	24.0	2305.7	4,678,494
1970	154.9	29.7		17.6	2194.6			9.9	2406.7	5,110,584
1971	496.1	18.1		13.4	1739.9			.4	2267.9	5,624,730
1972	429.5	1.3		4.7	1157.7			6.5	1599.7	5,049,112
1973	294.3	4.0		4.1	769.7			1.2	1073.3	4,284,252
1974	239.4				1335.7		12.6	83.4	1671.1	9,349,000
1975	184.8		105.3		1693.7			117.4	2101.2	12,092,000
1976	86.6	19.5	115.8	1.7	1977.9			.7	2202.2	15,645,000
1977	203.4		179.0		1810.7	45.4		23.2	2261.7	17,917,000
1978	197.4	15.1	96.2	2.2	1362.3	102.8	.6	10.0	1786.6	15,267,985
1979	132.7	44.4	168.1	2.0	1439.9	137.1	.3	21.7	1946.2	15,034,719

* In Chile and Peru, the "abalone" is the loco (Concholepas concholepus).

[1] Abalone is imported as frozen or canned meat. The shells are not included.

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled by the Bureau of the Census, Department of Commerce.

1954; Abbott, 1947). Garden snails and slugs are a constant nuisance to agricultural activities. Freshwater mussels are a major source of mother-of-pearl beads used in the culture of pearls. Freshwater snails serve as food for a few kinds of birds and for numerous species of edible fish. Many kinds of colorful land and tree snails are an important part of the land ecosystem and many of them are unique and limited to very small areas of the world. The destruction of trees and tropical timber forests has been responsible for the extinction of a number of tree snails in Hawaii, Melanesia and the Philippines. Accidental spillage of poisons into streams and the constant addition of pollutants into rivers have eliminated many species of freshwater shells in the United States and elsewhere.

Trade in the shells of land mollusks is at present largely limited to the Haitian Tree Snail (Liguus virgineus) and several species of Helicostyla Tree Snails from Luzon Island in the Philippines. Several thousand pounds of these snails are imported into the United States each year. Experiments with the U.S. Liguus tree snails in the Everglades of Florida by Archie L. Jones (1977) indicate that even intensive collecting cannot eliminate these snails. An area can be thoroughly combed for specimens, but the surviving and overlooked young and eggs permit the population to build up again within a year or two. The destruction of the trees or the lichen food that grows on them can eliminate these species. Further observations and research are necessary to determine the impact of the massive collecting of the Haitian Tree Snail that has been going on for at least 10 or 15 years. Dr. Fred Thompson (pers. comm.) of the Florida State Museum reported that vast areas of trees have been recently cut down in Haiti, thus eliminating many tree snail habitats.

Attempts were made between 1974 and 1978 by people more familiar with bird and mammal conservation than with mollusk biology to put the Florida Tree Snail (Liguus fasciatus) on the U.S. Endangered Species list. In a report to the Director of the U.S. Fish and Wildlife Service, Dr. Archie Jones (1977) quite carefully and cogently demonstrated the undesirability of putting this magnificent species on the threatened or endangered list. Partially as a result of his report the Everglades National Park Service now has a specific directive which allows the taking of Liguus in the Big Cypress National Preserve from October 1 to March 31, with a bag limit of 10 snails of each color form.

Other than freshwater pearly mussel, few freshwater species are used in the shell trade. The two-inch long, black snail (Faunus ater), from the Philippine estuarine rivers, is frequently seen in shop bins, but most wholesalers and retailers believe it to be a marine Terebra. The operculate "ramshorn" (Marisa), a South American snail introduced to Florida, is usually found in every shop as a bin shell. The shells of Corbicula, the freshwater Asian Clam, appear frequently in shell craft items and are probably imported from the Philippines and Japan, rather than from the huge wild populations in Florida. This introduced clam is edible, has an attractive shell, and has become a great nuisance because of its huge populations. Americans are unwilling to hand-collect them, and commercial rigs would adversely disturb canal, pond and lake beds if they were to collect them. The clam has spread to almost every permanent body of freshwater that is not subject to extreme freezing conditions.

E. U.S. Export of Shells to Foreign Countries

Approximately five million kilograms of shells are exported from

the United States annually (Table 9), mainly freshwater pearly mussels (Unionidae) going to Japan. Beads are made from these thick-shelled mussels, transplanted into the small pearl oysters (Pinctada mertensi) and in 6 to 12 months removed when a pearly nacre has covered them. Some conchs and cleaned fancy shells are shipped to the Bahamas for the tourist trade, including thousands of pink conchs (Strombus gigas) originally collected in Haiti. Shell dealers sell specimen shells by mail to collectors in foreign countries, especially in West Germany, Japan, Italy, France, and Australia. Collectively, there are probably about 500 people overseas buying specimen shells (Young, 1978).

F. Prices of Shells

By examining dealers' shell catalogs such as those of Ward's Natural History Establishment of 1906 and those of Walter F. Webb from 1910 to 1936, and comparing them with several price lists of today, it becomes evident that the prices of most of the common shells have risen in keeping with inflation, or the gradual devaluation of the dollar. The Tiger Cowrie sold for $0.05 in the early 1900s, for $0.25 in 1936, for $0.50 in 1970, and for $0.75 in 1980. Other common, large shells such as the pearl oyster (Pinctada margaritifera), the Ramose Murex (Murex ramosus), and the Bull Mouth Helmet (Cypraecassis rufa) have seen a similar rise in retail price from $0.25 to $4.00 or $5.00. During the political upheavals in Tanzania during the early 1960s the shell trade came to a virtual standstill, and the price of the Bull Mouth Helmet, from which the orange cameo is made, tripled in price.

The greatest fluctuations in prices have been among the specimen shells which are either uncommon in the areas where collecting is done or are in inaccessible habitats. There is probably no such thing as a

TABLE 9

U.S. EXPORTS OF CRUDE MARINE SHELLS
(in thousands of kg)

	Bahamas	Canada	Italy	Japan	Korea	Mexico	W. Germany	Other	Total Quantity (kg)	Total Value (US$)
1960	58.7	328.0	6.9	10195.5	4.8		124.2	84.3	10802.4	2,635,563
1961		30.9	15.9	5751.9		8.6	92.0	166.7	6066.0	1,379,991
1962		67.8	8.0	4775.8	7.1	74.6	23.6	61.7	5018.6	1,284,666
1963	.9	76.5	9.3	6602.3	13.5	72.8	4.8	32.3	6812.6	2,136,534
1964		997.2	6.0	6077.5	12.7	167.0	.5	292.4	7553.5	1,605,586
1965		3977.0		12081.8				196.7	16255.5	4,064,080
1966		5123.8		23361.3	69.8			663.8	29218.7	9,208,375
1967		10132.4	5.3	8578.8	127.5			283.7	19127.7	4,012,578
1968		8021.0		3032.6				335.5	11389.3	1,626,728
1969		6946.8		3950.6				462.0	11359.4	2,255,470
1970		2277.3		2764.2	20.8	47.5	15.4	153.3	5278.7	1,752,264
1971		898.6	36.3	620.5	39.4			238.0	1832.8	973,164
1972		1032.9	77.8	1639.7	50.4			235.3	3036.3	1,220,959
1973		3749.2	30.8	2438.4	96.6			224.5	6539.5	1,762,393
1974		661.7	43.0	1440.8	104.5		186.1	98.8	2534.9	1,573,284
1975		1244.8		1961.0				239.9	3445.7	1,916,620
1976		1023.4		3046.7	194.5			229.6	4494.2	2,842,260
1977		1097.9	82.0	4058.6	224.3			355.2	5818.2	4,633,693
1978		956.1		3015.8	526.2		57.9	244.8	4800.8	4,684,675
1979	34.1	825.4	61.9	3627.4	874.0	19.8	8.8	136.6	5588.0	5,744,217

Source: U.S. Imports (IM-146), U.S. Customs Service statistics, compiled By the Bureau of the Census, Department of Commerce.

rare or scarce marine species of invertebrate in the sense that we think of a bird, reptile or mammal as being rare or endangered. The Glory-of-the-Seas Cone (Conus gloriamaris) was known as an extremely rare shell for 160 years, and in 1962 a newly-found specimen sold for $2,000. In 1968, Australian scuba divers found beds of them off the Lunga River, Guadalcanal Island, Solomons. Two hundred specimens, representing about 90% of the population within a square mile (1.6 km^2), brought the price down to about $400 a specimen (pers. obs.). In the last five years a new method of acquiring this specimen by the use of tangle nets in the Philippines has added several hundred to the market. They sell now for about $150. Equally so-called rare shells, such as the cowries Cypraea guttata, C. valentia and porteri, and the cone shells Conus thomae and C. cervus, have dropped in price from several thousand to a few hundred dollars within a few months of finding new stocks.

The price of some shells of intermediate scarcity, such as the Violet-mouthed Scorpion Shell (Lambis violacea), the Imperial Harp (Harpa costata), and the Golden Cowrie (Cypraea aurantia), all from the Indo-Pacific, have risen from about $5 to $10 in 1915, to about $40 in 1940, and now, for the last four years have been selling for about $200 to $500, depending upon size and perfection. Harpa costata comes only from Mauritius, and newspaper accounts report that it is now illegal to collect live mollusks there.

Common shells, with good locality data and carefully cleaned, are sold by mail order to collectors. Although native collectors receive only a few pennies for their specimens, there is now a minimum price on lists of 50 cents to 75 cents because of the cost of handling. Some prices are unrealistic because the dealer does not know the relative abundance of the shell. Most dealers have difficulty identifying shells

new to their stock, and often make misidentifications.

In general, it may be said that the prices of shells considered to be uncommon and rare have risen rapidly in the last few years. This undoubtedly has encouraged the collecting of these types of shells, but considering the relatively few specimens (several hundred of each species) being captured, compared to the probable quantities in nature (perhaps several hundred thousand to several million of each species), there probably is no serious depletion occurring. Field studies and monitoring services are greatly needed to ascertain the real situation.

G. Shell Clubs

For over 100 years there have been scientific and semi-scientific assocations or clubs espousing and encouraging the study and collecting of shells. The earliest clubs in the United States were established at the turn of this century, and by 1979 there were 61, with memberships ranging from 20 to 200. Overseas there are another 50 clubs. There are two national organizations in the United States, one scientific (The American Malacological Union), the other for popular shelling (Conchologists of America), each having about 800 members.

IV. DOMESTIC SHELL TRADE IN THE U.S.A. AND FLORIDA

A. Types of Shells in the U.S.A.

The mollusk species of the United States are very variable because the country is bordered by several different major faunal provinces, from the Indo-Pacific surrounding the Hawaiian Chain and the Trust Territories in Micronesia, to the Arctic Province in Alaska, and four other provinces on the sides of the North American continent. The shells of tropical waters are more colorful and therefore appear in the shell trade more abundantly than those from northern waters.

Florida also has three provinces or subregions surrounding it. To the north the Carolinian Province extends from Virginia down to the central regions of Florida. It is characterized by such species as the Junonia Volute (Scaphella junonia) and the Busycon whelks (Busycon spp.). The southern tip of Florida is basically Caribbean in nature, with many tropical species found in the Keys. The West Coast of Florida is unique in its richness and has a concentration of species more or less limited to the area from Cape Sable in southwest Florida north to Cedar Keys. The northern part of the Gulf of Mexico has a few Caribbean species found offshore on the raised coral banks. About 2,000 marine species, including deepwater ones, have been found around the Florida coast. Malacologists estimate that there are about 500 common to abundant species several of which are commonly found in the shell trade (e.g., Fighting Conchs (Strombus alatus), cockles (Dinocardium robustum), coquina clams (Donax variabilis)).

Florida enjoys a worldwide reputation for shell collecting, both among tourists and local hobbyists. The Florida west coast is the richest because of the wide, rather shallow offshore shelf and the

amount of nutrients coming into the Gulf of Mexico from rivers such as the Mississippi.

Although Florida is fairly rich in shells in some areas, a very small percentage of shells from Florida or the southeast U.S. is seen in wholesale warehouses and retail shops. According to our surveys, the majority of dealers underlined the unwillingness of Americans to tackle the hard labor of collecting and cleaning shells at low prices that would compete with foreign imports. Previously, there were large quantities of Pink (or Queen) Conchs (Strombus gigas) harvested in the Lower Florida Keys, but severe overharvesting depleted this reserve, and recently a Florida State bag limit of 10 per person per day has eliminated this as a local commercial source. This conservation law (Appendix II) has been in effect since 1971, and, despite some poaching, the Pink Conchs are once again becoming rather common according to local fishermen.

There are several local sources of minor extent available to the retailer. Most wholesalers do not stock local shells, except on a chance purchase of a truck load of helmets (Cassis), Florida Horse Conchs (Pleuroploca gigantea), or the Junonia (Schaphella junonia). Some retail shop owners collect their own shells locally, such as the Lightening Whelk (Busycon contrarium), the Crown Conch (Melongena corona), the Giant Cockle (Dinocardium robustum), and Coquina (Donax variabilis). All are common at certain seasons in certain areas, and there is a feeling among collectors, biologists, and members of the Florida Natural Resources staff that these populations are maintaining themselves, except where city and industrial pollution have degraded harbors and bays.

Specimen shells are also obtained by mail-order or from scallop

fishermen in East Florida and from shrimp fishermen on the West Coast. Among many tens of thousands of specimens thus obtained are the Lion's Paw Scallop (Nodipecten nodosus), Cassis helmets (Pleuroploca), horse conchs, Junonias, several large species of cones, Distorsio tritons and a host of other collector's items. These shells come up in the commercial shellfishery dredges and trawls on an incidental basis.

There are still a few dozen professional shell pickers on the West Coast of Florida. They deliver the shells to wholesalers, and/or retail shops, or set up temporary roadside stands. The latter are not in much evidence because most local town ordinances prohibit temporary fruit and shell stands.

A large quantity of manufactured shell items, such as dolls, animals, boxes, mobiles, and plastic embeddings are produced in Florida by: 1) a few wholesalers, 2) about 30 retail shops, and 3) a large manufacturing establishment in Texas, the latter using shells from the western side of the Gulf of Mexico.

Large quantities of empty scallop shells (Argopecten gibbus) and A. concentricus are trucked from the Carolinas and East Florida shucking plants to South Florida warehouses. These are used extensively in shellcraft and souvenir items, especially as borders on wall mirrors.

Most shell shops elsewhere, including Hawaii, the Pacific Coast, and the eastern United States, do not stock many native species, mainly because tropical Pacific shells are prettier, more abundant and much cheaper. By-products of food mollusks, however, such as abalone shells in California and Busycon whelks in eastern U.S. are frequently seen in local shell shops.

B. Shell Dealers in Florida

There are about 250 Florida shell dealers today, including wholesalers, retailers, and mail order companies, who sell and buy shells and corals. Further, an estimated 5,000 to 10,000 small gift shops, restaurants, chain stores, and hotel shops carry either shell jewelry or souvenir shell items, to a lesser extent. Curiously, we found in our questionnaire that most dealers over-estimated the actual number of shell dealers there might be in Florida. Most thought there are 1,000 dealers. In our survey we found the following breakdown in the activities of these dealers:

1.	Retail shop only	41.0%
2.	Retail shop, plus wholesale	17.8%
3.	Wholesale only	17.3%
4.	Retail shop, plus mail order	10.9%
5.	Mail order only	8.0%
6.	Retail shop, plus wholesale, plus mail order	5.0%
		100.0%

The shell shops are scattered throughout Florida with the largest number in the areas of highest tourist activities: the West Coast, the Miami and Orlando areas, the Florida Keys, Jacksonville and the Panhandle. Wholesalers are mainly near shipping centers such as Miami and Tampa.

C. What the Dealers Sell

Each wholesaler and retail shop differs somewhat in its stock, depending upon the taste and purchasing opportunities of the owner. There are five categories of merchandise. Based on our mail survey

(Appendix II) and personal observations, we found that dealers (out of 80 respondents), were involved in the following trade categories:

1. Shell collector's items 69%
2. Shellcraft shells, shell novelties 68%
3. Cheap shells set out in bins 60%
4. Shell books 53%
5. Non-shell items 50%

We asked each dealer (Question 11), "What percentage of the sea products that you sell are shells, corals, other sea life?". The answers received were quite variable (see below):

	Wholesalers	Retail	Mail Order
Shells	Average: 80% Range: 50-98%	Average: 75% Range: 30-85%	Average: 95% Range: 90-100%
Corals	Average: 15% Range: 1-75%	Average: 20% Range: 5-50%	Average: 0% Range: 0%
Other Sea Life	Average: 5% Range: 0-10%	Average: 5% Range: 0-50%	Average: 5% Range: 0-10%

D. What Species of Shells are Sold

Of the estimated 40,000-or-so species of marine mollusks living today, probably only 5,000 are large enough, collectible and abundant enough to find their way into either the bulk or specimen shell trade channels. Appendix I lists the marine species seen in wholesale and/or retail shell shops. About 300 of the most popular species are listed, but another 4,700 are likely to appear on the market from time to time. Small, unusual species are handled mainly by mail order dealers, and a few retail shops with a superior knowledge of shells.

In answer to Question 5, "How do you obtain your shells? Please give approximate percentages.", the mean answers were:

	Wholesalers	Shops	Mail Order
From overseas in bulk	85%	5%	0%
From wholesalers in U.S.	4%	85%	5%
From local collectors	10%	5%	20%
By overseas parcel post	1%	4%	70%
By exchange	0%	1%	5%

Question 6 asked the countries of origin of shells. Dealers gave the folowing order of their sources: Philippines, Mexico, Haiti, India, Taiwan, Japan, East Africa, and other countries.

The most popular species selling in Florida shops today are the Pink Conch (Strombus gigas), various sand dollars, tiger cowrie (Cypraea tigris), Pink Mexican Murex (Phyllonotus erythrostomus), Chambered Nautilus (Nautilus pompilius), scallops (for decorative purposes), English Sea Urchins (Echinus esculentus), large clam shells (Hippopus and Tridacna), large showy gastropods (Voluta, Tonna, Syrinx, and Pleuroploca), small specimen cowries, cones, scallops and murex, coral, and heishi beads (based on Question 2, Section 2 of questionnaire - see Appendix II - and pers. obs.). In tourist souvenir shops, the most popular items are the Pink Conch and small baskets of mixed shells and coral.

E. Trends in the Shell Trade

Most of the shell dealers that we surveyed felt that there was an increase in the purchasing of shells by the public. Out of 80 replies, 31 dealers (39%) saw an increase in the last few years, 20 (25%) said it was the same, 7 (9%) saw a decrease, and 6 (7%) did not know. The recent recession of 1980 has undoubtedly slowed the shell shop business

to some extent. According to several mail-order dealers, however, collectors have not slowed their purchase of specimen shells. Many deepwater shells, collected by scuba divers and tangle-nets, have been coming on the specimen market in the last two years.

The degree of public interest in shells can be gauged to some extent by the number of shell books in print. In 1935, there were only four books available: Rogers (1908); Keep (1881); Webb (1935); and Arnold (1901). By 1950, there were eight popular seashell books in print in the U.S. In 1980, there are no less than 200 books on the market dealing with either the identification or biology of mollusks (Sage, 1980). One popular nature guide (Abbott, 1962) has sold over two million copies and is now in six foreign languages.

In our Section 2, Question 1, we asked, "Do you ever see any changes or trends in the buying habits of your shell purchasers?," we obtained many opinions, depending upon the nature of the business, location, and tastes and observational powers of the dealer. 25% said, "No trend." Of those commenting we found that shop owners had noticed a great decline over the last 10 years in the availability and the demand for small colorful shells for the making of jewelry and shellcraft items. This is evidently due to two factors: 1) the very popular hobby of making one's own shell jewelry has largely waned, thus the demand for small bivalve shells has greatly lessened, and 2) simultaneously, the Philippine shellcraft workers have been using most of their supplies of small rice shells (Olivella spp.) and dove shells (Columbella spp.) to make shell-covered animal figurines, a fad now enjoying great popularity.

Recently shell lamps and scallop-adorned mirrors have become popular, and the purchase of larger decorative shells and corals has increased.

Dealers felt that articles in national magazines could set trends. During 1977-1979 napkin rings made of sliced tiger cowries were the craze. Puka beads have come and gone, but in 1979-80 Heishi beads of cut shells have been most popular. Mail order dealers see rare shells selling more readily, and a trend away from the collector's favorites, such as cowries, cones, and murexes, and toward lesser groups and land species. A novel woman's purse made of the Chambered Nautilus (Nautilus pompilius) and leatherwork is now being imported from the Philippines and promises to be a popular item.

Seasonal trends are marked in Florida. Over half of the dealers said that winter was the busiest season, with spring following. A few, particularly wholesalers and mail-order dealers, said all seasons were active. One third reported summer as fairly active, especially in the northern part of Florida. Dealers report that they increased the number of employees during the busy season by about 30%. Winter buyers purchase larger quantities and more expensive items than do summer tourists.

V. THE NATURE AND ACTIVITIES OF FLORIDA SHELL DEALERS

The number of years in business varied from one year to 56 years. The average was 14 years but the mean (or majority) fell in the four to eight year classes. The number of employees varied from single mail-order dealers to wholesaler-retailer combinations (such as The Shell Factory and Shell World) employing between 100 and 130 persons. The typical retail shop has two to four employees, while wholesalers vary from 12 to 150, their mean being about 20 employees. Extrapolating from the unanswered returns from the questionnaire, we estimate that the 250 Florida shell dealers employ in the busy season about 1,000 persons, including themselves. Compared to the overall employment and economy of the state, this is a relatively small industry.

A. Wholesale Dealers

There are ten dealers in Florida handling shells solely on a wholesale basis, while another estimated 20 are wholesalers with an attached retail store. The average purely wholesaler has one or more large warehouses, usually packed to the ceiling with rows of opened and unopened crates and sacks of shells. An outdoor area is usually divided into a storage area for corals or crude shells and a section for cleaning and drying. Shells in bulk arrive from overseas in dirty condition, and often with extraneous sea growths. They require soaking in bleach, scrubbing, washing, and drying. Ragged lips are smoothed out on sanding wheels. Retail shell shop owners browse through the warehouse once or twice a year, sometimes taking away with them the more delicate or more expensive items and having the rest shipped. A few wholesalers send out catalogs or notices of recent imports and will take orders by telephone. Wholesalers are usually more knowledgeable about conditions and sources

overseas than retailers, and the ones I met were pleasant and cooperative. Apparently their profit margin is rather low because of the costs of transportation, breakage, cleaning, sorting, and packing. They depend upon volume to make up for the low 20% markup. Wholesalers usually make trips abroad every few years to gain new sources and improve business relations. Most of their sales are to Florida retailers, with from 10 to 35% of their business out of state, and in some cases up to 20% overseas.

There are also large importing wholesalers of shells and corals in California, Oregon, and New York. This report does not deal with those areas.

B. Retail Shops

There are approximately 200 specialty shops in Florida dealing mainly with shells (70%), coral (25%), and other sea life (5%). They are primarily oriented towards the winter tourist trade. Most of them obtain their shells and gift items from Florida wholesalers, although in many cases 10% of their stock comes from local collectors, 10% from Texas wholesalers, and from 10-50% by post from overseas. The shops are on the whole neat, attractive, and well-stocked. Each shows the mark of the manager and purchaser, and the emphasis may vary from tourist products to select specimen shells, and from crude shellcraft to exquisite, tasteful art. Shops run by a family or husband and wife team usually produce or modify their own shellcraft. A few retail shop owners are very knowledgeable about shells and are active in local shell clubs and conservation groups. From 90 to 100% of their sales are within Florida, but a few ship material to old customers in other states or overseas.

In addition to the several hundred kinds of shells listed in Appendix I,

the shops carry such non-molluscan items as sand dollars (Florida and Mexican), English Sea Urchins tests (without spines), starfish (Florida and foreign), dried seahorses, sea beans (seed of tropical vines), the spines of the Indo-Pacific pencil-spined sea urchin, sea fans (foreign), numerous figures, boxes, and bags made usually from Philippine shells, chimes and mobiles of the Philippine Window Pane Oyster (Placuna placenta), red and black coral necklaces, pins and broaches of abalone or mother-of-pearl, postcards of local interest, and booklets on seashells.

Apparently some shop owners often make very large cash sales and purchases. Exchanging surplus shell stocks is not uncommon among some dealers. Most retail dealers are conservation-minded, especially those living in good collecting areas, such as the Keys and the West Coast of Florida. They feel that over-collecting in local areas can be detrimental to anyone later wishing to collect a modest number of specimens. Two dealers who collect their own specimens told me that they do not capture live specimens that are too young, too old, or too flawed to be marketable.

C. Mail Order Dealers

A few specialized dealers concentrate on specimen shells and reach their customers by mail. They must be very knowledgeable about their subject, and constantly attempt to obtain the best possible specimens with good locality data. This is not usually a very profitable business and is only done part-time and carried out in connection with other sources of income. Some dealers set up sales stands at annual shell shows but the returns may not even pay their expenses. The annual gross income for this group probably varies from $5,000 to $120,000 per individual, the higher figure limited to a few well-known mail order dealers outside Florida. Some specimen dealers specialize in Florida

or Caribbean shells and obtain them from scuba divers, scallop dredgers, or shrimp trawlers. 90% of their overseas stock enters the U.S. by parcel post. Their customers are mainly from out-of-state and, in a few cases, private shell collectors in Europe. These dealers are usually active in shell clubs and are conservation-minded, knowing that over-collecting can make supplies scarce locally, and engender antagonism among club members. Many of them travel overseas to obtain rare specimens. They usually do not deal in corals, live fish, or other sea creatures.

D. Shell Dealers Elsewhere

In addition to the approximate 250 Florida establishments dealing mainly in shells, and to a much lesser extent corals, there are at least another 750 in the rest of the United States (Rice, 1979). By checking the telephone yellow pages and travelling 4,000 of Florida's tourist roads we found 230. Many retail shell shops we visited did not wish to be listed, mainly because they did not do mail order business. On this basis, we estimate there are about 1,000 bona fide shell dealers in the United States, with Florida (250), California (200), New York (50), Hawaii (50), Texas (50) and Oregon (24) having the most. Seaboard states have more shell shops than inland ones. Overseas, the countries having the most interest in shells are the Philippines (with possibly 100 shell shops), Great Britain, West Germany, Italy, France, Belgium, the Netherlands, Switzerland, and Japan.

VI. ATTITUDES AND BELIEFS OF FLORIDA SHELL DEALERS

Naturally, no generalization on the attitudes of shell dealers is possible, since their origins, ages, degrees of education, and lengths of experience vary considerably. Among the dealers one can find college graduates, retired engineers, biologists, actresses, writers, truck drivers, salesmen, and beachcombers.

We mailed 201 questionnaires (Appendix II) to Florida shell dealers and received 80 answers within 60 days. We purposely avoided any references to income, profits, taxes, or specific sources of materials because of the natural suspicion and underlying resentment of any governmental interference with small private businesses. One hundred twenty dealers did not answer, and we suspect that they did not want their privacy invaded, were too busy or not interested in answering, or felt that this inquiry might result in future controls that could jeopardize their livelihood. In general, we felt that the larger the business, the more reasonable were the answers. Of the 80 answering, 33 voluntarily identified themselves. Only one company returned the form without comment. Three companies were no longer in business.

1. Question 6 asked the dealers where they thought their shells come from. Elsewhere in this report, on the basis of U.S. Customs Import records, we listed the main sources as the Philippines, Mexico, Haiti, and East Africa. Wholesalers and mail order dealers were evidently quite accurate, but we found that about 20% of the retail shop operators either did not know or were not interested in knowing.
2. Question 10 was not satisfactorily worded, and put some respondents on the defensive: "Do you find that the present supply of shells (either from overseas, from wholesalers or from local collectors)

is adequate to fill your needs?". Of the 72 answers to this question, 44% said yes, 43% said that it varies, and 12% said no. Although one may take these answers on their surface value, I suspect that those who said yes were perhaps really saying, "We're getting all the shells we need; there is no shortage, and hence no need for controls." Giving an option to answer "varies," allowed 31 to beg the question as to whether there was a shortage of supplies or not. Naturally, there would be a variation in the availability.

3. Question 3 dealt with the opinion about what might cause shell populations to decrease. The answers were expected to be influenced, to some extent, by the dealer's knowledge of biology, but nonetheless it is interesting to note that pollution led among the causes (51%), and that disturbance of habitat was a close second (46%). Over-collecting was the third cause listed by 28% of the respondents*, and most of these were from the Sanibel-Captiva area where conservation and over-collecting is a local major concern. Sanibel Island has a national reputation for being a good place to collect shells. This is because the island is situated offshore on the shallow, shell-rich oceanic shelf bordering west Florida. Shells, both living and dead, are washed ashore in abundance periodically after three-day northern winter storms. The tourist business is good largely because of this phenomenon. The inhabitants of Sanibel and Captiva greatly resent massive, commercial or amateur over-collecting. The collective responses to this and the next question indicate that dealers are conscious of man's menace to the ocean's environment.

* The total percentage is greater than 100% because some dealers listed more than one answer.

4. Question 4 dealt with conservation controls: "If it could be proven by responsible biologists that certain kinds of shells were seriously endangered for any reason, would you approve of some sort of control (overseas or locally) or ban?". 71 answered, with an overwhelming number approving some sort of control (92%), and only six (8%) saying no. In the large space left for an answer, many respondents qualified their approval, and many were very reluctant to see controls or a ban because of the suspicion that it might be difficult to find "a responsible biologist"; others obviously disliked the idea of "unenforceable" controls or bans. The fact that the question stated "certain kinds of shells" and not "all shells" may have brought a high approval vote. The answers indicate, again, that the dealers are sympathetic toward the problem of endangered species, but quite apprehensive of any controls that might be unnecessary, unfair or unworkable.

5. Question 5 addressed itself to laws dealing with coral collecting. "There is now a Florida law against collecting Florida corals. Would you approve of a law against importing foreign corals, if it could be proven that coral reefs might be eventually eliminated by over-collecting?". In contrast to the qualified approval on protection for mollusks, most respondents were against a ban on importing foreign corals, and they were almost equally divided on the wisdom of controls. Of the 72 answering, 37 (51%) approved of a ban on imports, but most of them strongly qualified their approval. There appears to be a belief, whether correct or not, that the vast extent of the coral reefs in the East Indies and the ability for many species to replace themselves quickly does not warrant a ban. Many, including two large wholesalers, advocated

management controls, similar to those done in forestry. The remainder, 49%, expressed the feeling that a) corals are not threatened, b) a ban would hurt employment overseas, c) we should not impose our standards on the peoples of other countries, and d) bans are difficult to enforce. The "if it could be proved" raised the question of "could it be proved?".

6. Question 10 bluntly asked, "In your opinion, do you think the world supply of shells is almost inexhaustible (barring a great ecologic catastrophe)." This was a simplistic question with undertones of conservation emotionalism. The qualification in the question (barring a great ecologic catastrophe) might not have been understood by some respondents. Answers were given by 66 dealers:

No (exhaustible)	20 (30%)
Probably (inexhaustible)	19 (29%)
Yes (inexhaustible)	17 (26%)
Maybe	7 (11%)
No opinion	3 (5%)

If one combines the yes, probably, and maybe answers, it appears that the vast majority believe that man's demands on the world's shell resources cannot outstrip nature's ability to produce. Few, if any, of the dealers are aware that today's mollusk food catch alone is about one billion kilograms a year; had they been, more would probably have answered that the shell supply was "inexhaustible." It should be remembered that this is a predictable response, and in no way indicates the actual facts as to whether or not over-collecting is taking place.

7. Question 12 dealt with shells that were by-products of shellfishery

food activities. "Please make a rough guess as to the percentage of the shells you deal in that are by-products of shellfishery food activities (such as scallop shells, abalones, pink conchs, mussels, etc.)." 71 answered as follows:

Less than 10% (used for food)	26 (37%)
About 50%	26 (37%)
More than 50%	7 (10%)
Don't know	5 (7%)
Volunteered "25%" answer	7 (10%)

The above answers reflect only the opinion of the dealers. Only a few dealers who have been overseas and seen the actual collecting methods of the fishermen would be able to give realistic answers. No estimated figure has ever been published and it probably ranges from 0% to 95%, depending on the type of shell and where it is collected. Some edible species of mollusks are collected and cleaned for their shells alone. Most abalones, many scallops, and Pink Conchs (with cuts in the shell) found in the shops were probably used for food. In some countries, such as Chile, England, Senegal, and China, there are millions of metric tons of shells from edible mollusks being discarded and not being used in the shell trade such as the "loco" (Concholepas), the cockle (Ceratoderma), volutes (Cymbium), and whelks (Hemifusus).

IX. LEGISLATION AND CONSERVATION

A. Shell Collecting and Shellfishery Laws

Many countries have now passed laws to reduce excessive shell collecting or even ban the export of shells. The most successful and evidently most popular method is to set aside national marine parks or sanctuaries from which many marine species can migrate to and re-populate other areas. Each of the coastal states in the United States and each coastal province in Canada has passed laws which are primarily intended to conserve edible mollusks and protect the legitimate interests of resident commercial shellfishermen. Unfortunately, the regulations vary from state to state, and in many instances they are ambiguous, scientifically inaccurate, and contradictory (Abbott, 1961). The laws are revised from time to time, and may be superceded by local public health announcements according to pollution conditions.

Many states and provinces require a license to collect some species of edible bivalves. There are size, season and bag limits in many states. It is evidently illegal for tourists to collect live shells in Maine. In California you must have a sport fishing license and collect only edible mollusks, unless you write for permission to collect for research purposes. Restrictions on abalone collecting are explicit. Night collecting is prohibited in some states. Oyster beds are "off limits" except to the owners or to the public in designated areas. The state of Florida passed a law in 1971 (Appendix III) aimed at the serious over-collecting of conchs in the lower Florida Keys. The collection of the Queen, or Pink, Conch by one person is limited to 10 per day, and only 20 may be stockpiled. Shell collectors and fishermen reported to me that the conch has come back in large numbers in many areas in the Keys. Florida has a closed season (June 1 through

August 31) for oysters, a 3-inch minimum length (7.62 cm) and a possession limit for individuals of two bushels, and a boat limit, regardless of the number of occupants, of four bushels. Clams of all kinds are always in season, have no size limits, but the possession limits are two bushels per individual and four bushels per boat.

In the state of Florida it is "unlawful to take, possess, or destroy sea fans, hard corals, or fire corals unless it can be shown by certified invoice that it was imported from a foreign country. Coral may not be taken or possessed in John Pennekamp Coral Reef State Park" (Appendix II). There is also a Federal law prohibiting the collecting of sea life at Dry Tortugas Island near Key West.

B. Over-Collecting and Conservation

Some communities, such as Sanibel and Captiva, have been concerned with over-collecting which affects their tourist business, angers resident shellers, and has been purportedly reducing shell populations. Public signs, brochures, newspaper announcements, and conservation-education by shell clubs and nature centers have been fairly successful in reducing over-collecting, except for occasional abuses. Informal studies have been made and most marine biologists agree that over-collecting reduces the number of living mollusks in the area that was over-collected, but that there is no real threat to the species in the general area or as a whole. Since larval forms are extremely abundant (in the order of one million to 30 million from one female per season), and since the life span is short for most mollusks (scallops, two years; many conchs, four years), these over-collected areas can build up fairly soon, if not over-collected continuously or if protected after the fact.

For example, colonies of the Calico Clam (Macrocallista maculata)

are sometimes greatly disturbed by strong winds along the Gulf Coast of Sanibel. I have seen hundreds of thousands cast up on the beach, and have seen shell collectors removing many bushels of living and dying clams. Later, for several months, these clams are hard to find within a thousand yards of shore. Within a year or two the clams are back in large numbers. William Lyons (pers. comm.) in the Hourglass Survey (Florida Department of Natural Resources) reports a heavily populated bed of these clams approximately 16 km in width and 64 km in length. Floating larvae from these billions of clams are probably scattered 80 to 160 km from this central bed.

There evidently is a natural sporadic build-up and occasional mass mortality of shell populations along the west coast of Florida. This has been recorded since the 1880s. Severe cold winds with low tides, or a season of heavy Gonyaulax Red Tide can cause massive kills, and hence create huge jettison rows of dying shells along the strands. It is generally conceded that any abrupt natural or human-related disturbance to the environment such as storms, change of currents, freezing temperatures, Red Tides, pollution, excessive dredging, excessive use of power boats, or dynamite are far more dangerous to the health of marine populations than over-collecting.

Over-collecting of specific species of mollusks probably has some effect on the ecological balance of the marine community, since clams may serve as food for fish, carnivorous whelks, and certain crustacea, and since carnivorous snails feed on worms, carrion and clams. The marine community, with its many inter-related assocations, may be complicated and sometimes delicately balanced, but it also has an amazing resiliance and ability to adjust with natural substitutes (Rickets and Calvin, 1968).

Is there over-collecting in Florida and in such places as Haiti and the Philippines? Not many pertinent facts are available, although there are eye-witness and substantiated accounts of local over-collecting, especially of the larger, edible, or prettier species. Over-collecting has reduced the density of the edible Surf Clam (Spisula solidissima) from New York to Maryland to the extent that they are no longer available in commercial quantities. It may take between 10 and 20 years for these beds to replenish themselves. In many local areas, certain species are no longer in sufficient adult numbers to satisfy the normal, modest requirements of hobby collectors.

Among the Caribbean and Florida species that are being over-collected in some limited areas are the Pink Conch (Strombus gigas), the Queen Helmet (Cassis madagascarensis), the Florida Horse Conch (Pleuroploca gigantea), Triton's Trumpet in Haiti (Charonia variegata), the Angel Wing (Cyrtopleura costata), the Flamingo Tongue found on sea fans (Cyphoma gibbosum), and the King's Crown (Melongena corona). Although these species are uncommon where over-collecting has occurred, they cannot in the immediate, foreseeable future be considered endangered or threatened with extinction. This is because in a vast marine environment, there are many untouched and difficult areas in which to collect. Here adults, young, egg capsules, and free-swimming larvae of some species are available to refill sparse, over-collected populations.

No intelligent action can be taken until a field survey is made. In the past, there have been good surveys of certain species, such as the work of Rao (1937) in India on the Trochus top shell. Similar studies were done many years ago on the Chank Shell (Turbinella pyrum) of Ceylon by J. Hornell (191[illegible]. The fact that a million Trochus shells of a certain species are imported into various countries has no significance

unless we know the productivity of the species, its abundance in nature, other general information about its life history, and the impact of collecting on the marine community. If the living population of a Trochus reaches maturity and a collectible size in four or five years, it is quite likely that the harvesting of 10 or 20 million specimens a year is not deleterious. Conversely, if the population is estimated to be only 40 million or less, it would be evident that over-collecting was occurring, and that fisheries controls were necessary.

Some of these surveys should be the responsibility of foreign governments. Recently, there has been a tremendous interest in the Chambered Nautilus (Nautilus pompilius) with several dozen research workers from Japan, the United States, New Zealand, England and New Caledonia. Consultation with these experts, together with cooperation from the Philippines, should help answer the question, "Is the Chambered Nautilus being over-fished and is it in danger of being eliminated?". At present there are conflicting views; some observers report that most of the shells which are collected are floating and dead, while others say trapping live specimens is the major method of obtaining them (Dugdale, 1980).

VIII. RECOMMENDATIONS

In view of the stresses being put on mollusk populations in most parts of the world, it is recommended that several steps be taken:

1. Assemble a roster, and coordinate through communication, the various organizations, government bureaus, scientific societies, and amateur groups that are presently carrying out, or potentially able to engage in conservation efforts, especially for mollusks and other invertebrates.
2. Educate the general public about the deterioration of our environment, giving the main causes and possible solutions. Place emphasis on the protection of the environment, not on individual species of invertebrates.
3. Encourage and gain support for biological surveys and governmental and private monitoring programs in areas in the world where the major shell-collecting activities are taking place, and make known major areas that are being threatened by pollution, over-development, and other activities of man.
4. Develop and encourage the passing and enforcing of state and federal laws that will protect populations of mollusks and other invertebrates that are suffering from over-collecting. Develop methods for controlled harvesting of mollusks, and the setting aside of more marine sanctuaries.

SUMMARY

Approximately four million kilograms of shell and 500,000 kilograms of coral are imported by the United States every year. In addition, the United States imports $7 million worth of shell articles and $4 million of precious coral yearly. Most raw shells and coral come from the Philippines. However, many of the shells in trade were first collected for their meat, consumed locally, and then exported for their shell as a "secondary" product. We were not able to determine the effect or level of damage over-collecting had on the marine environment.

Some 5,000 species of shells can be found in the larger shell shops in Florida. Shell dealers responding to a TRAFFIC(U.S.A.) questionnaire appeared quite knowledgeable regarding their stocks and trade routes. The majority of the dealers felt that shell collecting does not harm the mollusk species or the environment.

It is recommended that biological investigations be made in regions of intensive shell collection.

ACKNOWLEDGEMENTS

We would like to thank the many shell dealers, shell collectors, and malacologists in Florida who so freely offered information and advice. Among the many were William G. Lyons of the Florida State Marine Research Laboratory in St. Petersburg; Dr. Fred G. Thompson of the Florida State Museum in Gainesville; Mr. Johnnie Johnson of the Brevard County Museum; Mr. Gary Magnotte of Burry's Shell Museum in Pompano Beach; Mr. Jimmie Crant of Shell World in Orlando; Mr. Bob Dickerson of Tur-Lu Shellers in Goodland; Mr. Robert J. L. Wagner of Marathon; Mr. Archie L. Jones of Miami (Liguus information); Selma R. Lawson of Pass-A-Grille; the Almark Coral and Shell Co., Miami; Atlantic Coral Enterprises of Davie; and The Shell Factory of Ft. Myers, Florida.

In addition, I thank Susan Wells at the Species Conservation Monitoring Unit, Cambridge, England and George Robertson, Center for Natural Areas, Washington, D.C. for their review of the various drafts.

I would also like to thank the staff of TRAFFIC(U.S.A.) for their great assistance in preparing this report and, in particular, David Mack, who supplied all the U.S. import and export statistics.

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APPENDIX I

Census of Shells for Sale in Florida Shell Shops in 1980

Kind of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
Family Pleurotomariidae								
Genus Pleurotomaria hirasei Pils	Emperor's Slit Shell	deep-sea uncommon	Japan	1%	rare	specimen	no	$75-$125
Family Haliotidae								
Genus Haliotis								
rufescens Sw.	Red Abalone	offshore rocks common	California	20%	common	souvenir; bin shell	yes	$1-$6
corrugata Wood	Pink Abalone	offshore rocks common	California	10%	common	souvenir; bin shell	yes	$1-$4
crackerodi Leach	Black Abalone	offshore rocks common	Calif.- Mex.	10%	common	souvenir; bin shell	yes	$1-$3
asinina L.	Donkey Ear Abalone	shallow; subtidal	Indo-Pacific	30%	common	bin shell	no	$.50-$.75
iris Martyn	Paua	offshore rocks common	New Zealand	10%	uncommon	jewelry	yes	$5-$15 polished
fulgens Phil.	Green Abalone	offshore rocks common	California	10%	uncommon	souvenir bin shell	yes	$1-$4
tuberculata L.	Ormer	subtidal rocks	W. Europe	5%	uncommon	bin shell	yes	$.50-$1
diversicolor Rve.	Japanese Abalone	subtidal rocks common	W. Pacific	5%	common	bin shell	yes	$.50-$1

d of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
nily issurellidae								
nus issurella arbadensis Gm.	Keyhole Limpet	intertidal rocks abundant	West Indies	30%	common	shellcraft; bin shell	no	$.05-$.15
nily atellidae		(all on rocks)						
nus atella ulgata L.	European Limpet	intertidal abundant	Europe	5%	uncommon	bin shell	yes	$.10-$.50
ongicosta Lam.	Spiked Limpet	intertidal common	S. Africa	1%	uncommon	specimen	no	$1-$3
nus cmaea accharina L.	Sweet Limpet	intertidal abundant	W. Pacific	10%	common	bin shell	no/yes	$.05-$.15
estudinaria L.	Turtle Limpet	intertidal abundant	S.W. Pacific	20%	common	bin shell; jewelry	no/yes	$.15-$.50
nily rochidae								
nus rochus loticus L.	Commercial Top Shell	offshore abundant	S.W. Pacific	30%	common	bin shell button source	yes	$1-$2

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Trochus pyramis Born	Pyramid Top	offshore abundant	S.W. Pacific	20%	common	bin shell; specimen	no/yes	$.50-$1
maculata L.	Maculated Top	subtidal abundant	S.W. Pacific	30%	common	bin shell	no/yes	$.25-$.50
conus Gm.	Cone Top	subtidal abundant	S.W. Pacific	10%	uncommon	bin shell	no/yes	$.25-$.50
Genus Umbonium vestiarium L.	Dwarf Button Shell	intertidal abundant	Indo-Pacific	60%	abundant	shellcraft; souvenirs	no	$.05-$.15
giganteum Less.	Giant Button Shell	intertidal abundant	Japan	30%	common	shellcraft; bin shell	no	$.10-$.25
Genus Callicstoma formosense Sm.	Formosa Top Shell	offshore common	Taiwan	10%	common	specimen; bin shell	no	$1-$2
jujubinum Gm.	Jujube Top Shell	subtidal common	West Indies	10%	common	bin shell	no	$.25-$1
haliarchus Mel.	Haliarchus Top Shell	offshore common	Japan	5%	uncommon	specimen	no	$1-$4
Genus Cittarium pica L.	West Indian Top Shell	subtidal abundant	West Indies	10%	uncommon	bin shell	yes	$.50-$1
Genus Bathybembix argenteonitens Ph.	Giant Silver Top Shell	deep water common	Taiwan Japan	10%	common	specimen; bin shell	no	$.50-$1
Genus Gibbula cineraria L.	Silver Tommie	subtidal abundant	W. Europe	30%	abundant	shellcraft	no	$10/gal. polished

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us anculus araonius L.	Strawberry Top Shell	subtidal common	S.W. Pacific	20%	common	specimen; shellcraft	no	$.50-$2
niceus Phil.	Indian Strawberry Top Shell	subtidal common	East Africa	10%	uncommon	specimen; shellcraft	no	$.50-$2
us rysostoma radoxum Born	Orange Marble Top Shell	subtidal grass abundant	S.W. Pacific	20%	common	shellcraft; bin shell	no	$.10-$.15
ily Angariidae								
us Ancaria elphinus L.	Delphinula	subtidal abubdant	S.W. Pacific	20%	common	bin shell	no	$.20-$.50
ily Turbinidae								
us Turbo rmoratus L.	Green Turban	offshore common	S.W. Pacific	20%	common	specimen; bin shell (button source)	no/yes	$1-$5
stanea Gm.	Chestnut Turban	subtidal common	West Indies	5%	uncommon	bin shell	no	$.20-$.50
tholatus L.	Tapestry Turban	subtidal abundant	S.W. Pacific	20%	common	bin shell (cat's eye)	no/yes	$1-$2
rnutus Ltft.	Horned Turban	subtidal abundant	Japan	10%	common	bin shell	yes	$.25-$1
gyrostomus L.	Silver-mouth Turban	subtidal reefs common	S.W. Pacific	20%	common	bin shell	no/yes	$.25-$.50

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Turbo chrysostoma L.	Gold-mouth Turban	reefs common	S.W. Pacific	20%	common	bin shell	no/yes	$.25-$.50
canaliculata H.	Channelled Turban	offshore uncommon	West Indies	5%	uncommon	bin shell	no	$1-$2
coronatus Gm.	Coronate Turban	subtidal common	East Africa	10%	common	bin shell	no	$.25-$.50
Genus Guildfordia triumphans	Triumphant Star	offshore common	Japan Taiwan	20%	common	bin shell	no	$.50-$1
yoca Jous.	Yoka Star	offshore common	Japan	10%	uncommon	bin shell	no	$1-$2
Genus Astraea heliotropium M.	Sunburst Star	offshore uncommon	New Zealand	5%	uncommon	specimen	no	$3-$7
phoebia Röd.	Long-spined Star	subtidal common	West Indies	10%	common	bin shell	no	$.25-$.50
Family Phasianellidae								
Genus Phasianella australis Gm.	Painted Pheasant Shell	offshore common	S. Australia	5%	uncommon	specimen	no	$.50-$1
Family Neritidae								
Genus Nerita peloronta L.	Bleeding Tooth	intertidal rocks abundant	West Indies	80%	abundant	bin shell; shellcraft	no	$.10-$.25
versicolor Gm.	Four-toothed Nerite	intertidal rocks abundant	West Indies	40%	abundant	binshell; shellcraft	no	$.05-$.15

nd of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
erita								
olita L.	Polished Nerite	intertidal abundant	Indo-Pacific	30%	abundant	bin shell	no	$.10-$.20
extilis Gm.	Textile Nerite	intertidal rocks common	East Africa	5%	uncommon	bin shell	no	$.15-$.30
nus Neritina								
irginea L.	Virgin Nerite	intertidal sand abundant	West Indies	5%	uncommon	shellcraft	no	$10/gal.
ommunis Q.	Communal Nerite	mangroves	Indo-Pacific	10%	common	shellcraft; bin shell	no	$10/gal.
urrita Gm.	Turret Nerite	intertidal mud abundant	Philippines	10%	common	shellcraft; bin shell	no	$15/gal.
nus Puperita								
upa L.	Pupa Nerite	shore rocks abundant	West Indies	10%	common	shellcraft	no	$15/gal.
nus Smaragdia								
iridis L.	Emerald Nerite	eelgrass beds common	West Indies	5%	uncommon	shellcraft	no	$25/gal.
mily Littorinidae								
nus Littorina								
scabra L.	Rough Periwinkle	mangroves abundant	Indo-Pacific	5%	uncommon	shellcraft bin shell	no	$10/gal.
nus Tectarius								
grandinatus Gm.	Grand Periwinkle	rock shores abundant	S.W. Pacific	10%	common	bin shell; shellcraft	no	$.05-$.10

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Family Turritellidae								
Genus Turritella								
terebra L.	Auger Turritella	intertidal abundant	Indo-Pacific	20%	common	bin shell	no	$.25-$.4
Family Architectonicidae								
Genus Architectonica								
maxima Phil.	Giant Sun Dial	offshore abundant	W. Pacific Japan	50%	common	bin shell	no	$.25-$.7
Genus Vermicularia								
knorri Desh.	Knorr's Wormshell	subtidal abundant	Florida	10%	common	bin shell; shellcraft	no	$.25-$.3
Family Modulidae								
Genus Modulus								
modulus L.	Florida Button Shell	eelgrass beds abundant	Florida West Indies	10%	common	shellcraft	no	$15/gal.
Family Potamididae								
Genus Telescopium								
telescopium	Telescope Cerith	mangroves abundant	S.W. Pacific	30%	common	bin shell; cut shell	no	$.20-$.5
Genus Terebralia								
palustris L.	Swamp Cerith	mangroves abundant	Indo-Pacific	20%	common	bin shell	no	$.10-$.1
Family Cerithiidae								
Genus Cerithium								
aluco L.	Aluco Cerith	subtidal sand common	Indo-Pacific	20%	common	bin shell	no	$.10-$.2

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erithium asciatum Brug.	Banded Cerith	subtidal sand common	Indo-Pacific	10%	common	bin shell	no	$.10-$.20
ertegus L.	Common Vertegus	intertidal abundant	Indo-Pacific	20%	common	bin shell	no	$.10-$.20
itteratum Born	Lettered Cerith	subtidal abundant	West Indies	30%	common	shellcraft	no	$10/gal.
odulosum Brug.	Noduled Cerith	reefs abundant	Indo-Pacific	20%	common	bin shell	no	$.20-$.50
mily Epitoniidae								
nus Epitonium calare L.	Precious Wentletrap	offshore common	Indo-Pacific	60%	uncommon	specimen	no	$3-$7
ngulatum Say	Angulate Wentletrap	subtidal common	Florida	10%	uncommon	shellcraft	no	$.10-$.2
mily Aporrhais								
nus Aporrhais espelecani L.	Pelican's Foot	offshore abundant	Mediterranean	50%	common	bin shell	no	$.20-$.30
mily Strombidae								
nus Tibia usus L.	Spindle Tibia	offshore common	Philippines	10%	uncommon	specimen	no	$6-$10
nsulaechorab Röb.	Arabian Tibia	offshore common	Indian Ocean	25%	common	bin shell	no	$1-$2

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Genus Lambis								
lambis L.	Common Spider Conch	subtidal abundant	Indo-Pacific	50%	common	bin shell	no/yes	$.50-$1.
arthritica Röd.	Arthritic Spider Conch	subtidal abundant	Indian Ocean	30%	common	bin shell	no	$1-$3
chiragra L.	Chiragra Spider Conch	reefs common	S.W. Pacific	40%	common	bin shell	no/yes	$3-$6
millepeda L.	Milleped Spider Conch	offshore common	Philippines	40%	common	bin shell	no	$1-$2
truncata Ltft.	Truncate Spider Conch	offshore common	Indian Ocean	40%	common	bin shell	no/yes	$4-$9
scorpius L.	Scorpion Spider Conch	offshore common	Philippines	40%	common	bin shell; specimen	no	$2-$3
Genus Strombus								
aurisdianae L.	Diana Conch	subtidal common	Philippines	30%	common	bin shell	no	$.50-$1
canarium L.	Dog Conch	subtidal abundant	Philippines	40%	abundant	bin shell	no/yes	$.20-$.7
costatus L.	Milk Conch	subtidal common	West Indies	20%	common	bin shell	yes	$1-$3
gallus L.	Rooster-tail Conch	offshore uncommon	West Indies (Haiti)	10%	uncommon	bin shell; specimen	no	$3-$7
gigas L.	Pink Conch	subtidal common	West Indies	90%	common	bin shell	yes	$2-$5
gibberulus L.	Humped Conch	intertidal abundant	Indo-Pacific	70%	common	bin shell	no	$.15-$.3

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trombus atissimus L.	Broad Conch	subtidal uncommon	S.W. Pacific	20%	uncommon	specimen	no	$3-$6
isteri Gray	Lister's Conch	offshore common	Andeman Sea	10%	uncommon	specimen	no	$6-$12
entiginosus L.	Silver Conch	subtidal common	Indo-Pacific	30%	common	bin shell	no	$.50-$1
uhuanus L.	Strawberry Conch	subtidal abundant	Indo-Pacific	80%	common	shellcraft; bin shell	no/yes	$.20-$.40
ugilis L.	Fighting Conch	subtidal abundant	West Indies (Haiti)	60%	common	bin shell	no/yes	$.30-$.70
latus Gm.	Fighting Conch	subtidal common	Florida	30%	common	bin shell	no	$.30-$.70
mily Cypraeidae								
nus Cypraea nnulus L.	Gold-ringer	intertidal abundant	Indo-Pacific	100%	abundant	shellcraft; bin shell	no	$5/gal.
rabica L.	Arabian Cowrie	subtidal common	Indo-Pacific	80%	abundant	bin shell;	no	$.20-$.50
urantius Gm.	Golden Cowrie	offshore rare	S.W. Pacific	10%	rare	specimen	no	$250-$400
aurica L.	Caurica Cowrie	subtidal common	Indo-Pacific	40%	common	bin shell	no	$.10-$.50
aputserpentis L.	Snakehead Cowrie	intertidal common	Indo-Pacific	30%	common	bin shell	no	$.15-$.25

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Cypraea								
cervus L.	Atlantic Deer Cowrie	subtidal common	Florida Keys	20%	uncommon	specimen	no	$1-$2
cylindrica Born	Cylindrical Cowrie	subtidal common	Indo-Pacific (India)	20%	common	bin shell	no	$1.0-$.25
eglantina Duc.	Eglantine Cowrie	subtidal common	S.W. Pacific	20%	common	bin shell	no	$.25-$.50
lynx L.	Lynx Cowrie	subtidal common	S.W. Pacific	20%	common	bin shell	no	$.25-$.50
mappa L.	Map Cowrie	offshore uncommon	S.W. Pacific	20%	common	specimen	no	$1-$5
moneta L.	Money Cowrie	intertidal abundant	Indo-Pacific	90%	abundant	shellcraft; bin shell	no	$15/gal.
ocellata L.	Ocellate Cowrie	subtidal common	India	10%	common	bin shell	no	$.20-$.30
spadicea Sw.	Chestnut Cowrie	intertidal common	California	5%	uncommon	specimen	no	$1-$2
tigris L.	Tiger Cowrie	subtidal abundant	Indo-Pacific	100%	abundant	bin shell	no	$.40-$1
vitellus L.	Pacific Deer Cowrie	subtidal common	Indo-Pacific	40%	common	bin shell	no	$.50-$.60
Family Ovulidae								
Genus Ovula								
ovum L.	Egg Cowrie	subtidal common	Indo-Pacific (Philippines)	50%	common	bin shell	no	$1-$2

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enus Calpurnus verrucosus L.	Wart Egg Cowrie	subtidal common	Philippines	20%	common	bin shell	no	$.50-$.70
enus Cyphoma gibbosum L.	Flamingo Tongue	on seafans common	West Indies Florida	60%	common	bin shell; shellcraft	no	$.15-$.30
enus Volva volva L.	Shuttlecock	subtidal uncommon	S.W. Pacific	10%	uncommon	bin shell; specimen	no	$.25-$2
amily Naticidae								
enus Polinices duplicatus Say	Shark Eye Natica	subtidal sand common	Eastern U.S. Florida	30%	common	bin shell; shellcraft	no	$.20-$.30
canrena L.	Gaudy Natica	subtidal sand common	West Indies Florida	10%	common	bin shell	no	$.20-$.30
maamilla L.	White Moon	intertidal abundant	Indo-Pacific	80%	abundant	shellcraft; bin shell	no	$.10-$.20
stellata Hed.	Star Moon	subtidal common	S.W. Pacific	10%	common	bin shell	no	$.20-$.30
enus Sinum perspectivum Say	Baby's Ear Sinum	intertidal common	Florida	5%	uncommon	shellcraft	no	$.20-$.25
amily Cassidea								
enus Cassis cornuta L.	Horned Helmet	offshore common	Indo-Pacific	90%	common	showy shell	no/yes	$5-$10

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Cassis tuberosa L.	King Helmet	offshore common	West Indies	50%	common	showy shell	no	$5-$10
madagascariensis Lam.	Queen Helmet	offshore common	Florida	40%	common	showy shell	no	$5-$10
flammea L.	Flame Helmet	subtidal common	West Indies	20%	uncommon	showy shell	no	$3-$5
rufa L.	Bull's Mouth Helmet	subtidal common	Indo-Pacific (E. Africa)	50%	common	showy shell (cameos)	no	$3-$8
enus Cypraecassis testiculus L.	Cowrie-helmet	offshore uncommon	West Indies (Haiti)	10%	uncommon	bin shell	no	$1-$1.50
enus Phalium decussatum L.	Decussate Bonnet	offshore common	Taiwan	30%	common	bin shell	no	$.50-$1
areola L.	Checkerboard Bonnet	subtidal common	Philippines	20%	common	bin shell	no	$.50-$1
strigatum Gm.	Striped Bonnet	subtidal common	East Africa	10%	common	bin shell	no	$.50-$1
granulatum Born	Scotch Bonnet	offshore common	Southwest U.S.	10%	uncommon	bin shell; shellcraft	no	$.50-$1
enus Casmaria erinaceus L.	Vibex Bonnet	subtidal common	Philippines	30%	common	bin shell	no	$.20-$.80

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amily Cymatiidae								
enus Charonia								
tritonis L.	Triton's Trumpet	subtidal common	Indo-Pacific	40%	common	showy shell	no	$6-$35
variegata Lam.	Triton's Trumpet	subtidal common	West Indies (Haiti)	60%	common	showy shell	no	$6-$20
enus Cymatium								
lotorium L.	Lotorium Triton	subtidal uncommon	Indo-Pacific	20%	uncommon	bin shell	no	$1-$3
perryi Emer.	Perry's Triton	subtidal uncommon	India	10%	uncommon	bin shell	no	$1-$3
pileare L.	Hairy Triton	subtidal common	Indo-Pacific	30%	common	bin shell	no	$.50-$1
femorale L.	Angular Triton	intertidal uncommon	Florida West Indies	20%	uncommon	specimen	no	$2-$5
muricinum Röd.	White Triton	intertidal common	Indo-Pacific West Indies	20%	common	bin shell	no	$.30-$.5
enus Bursa								
bubo L.	Giant Frog Shell	subtidal common	Philippines	40%	common	showy shell	no	$3-$10
rana L.	Elegant Frog Shell	subtidal common	Philippines	30%	common	bin shell	no	$1-$1.50
perca Perry	Winged Frog Shell	offshore common	S.W. Pacific	40%	common	bin shell; souvenir	no	$.30-$1
echinata Link (spinosa Lam.)	Spiny Frog Shell	offshore common	India	20%	abundant	bin shell	no	$.20-$1

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Family Tonnidae								
Genus Tonna galea L.	Giant Tun	subtidal common	Indo-Pacific West Indies	20%	common	showy shell	no	$5-$9
luteostoma Kus.	Japan Tun	offshore common	East Asia	10%	common	bin shell	no	$1-$3
perdix L.	Partridge Tun	subtidal common	Indo-Pacific West Indies	30%	common	bin shell	no	$1-$3
sulcosa Born	Sulcose Tun	offshore common	East Asia	30%	common	bin shell	no	$1-$3
Genus Malea pomum L.	Dwarf Grinning Tun	offshore common	Philippines	20%	uncommon	bin shell	no	$.50-$1
Genus Ficus communis Röd.	Atlantic Fig Shell	subtidal common	Florida	10%	uncommon	bin shell	no	$.50-$.60
Family Muricidae								
Genus Murex ramosus L.	Giant Pacific Murex	reefs common	Indo-Pacific	60%	common	showy shell	no	$4-$15
pecten Ltft.	Venus Comb Murex	offshore common	Indo-Pacific	60%	common	specimen; bin shell	no	$4-$15
brunneus Link	Adustus Murex	subtidal abundant	Indo-Pacific	50%	abundant	bin shell	no	$.50-$1

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Murex cichoreus Gm.	Endive Murex	subtidal common	S.W. Pacific	70%	abundant	bin shell	no	$.50-$1
erythrostoma Sw.	Pink-mouth Murex	offshore abundant	W. Mexico	70%	abundant	bin shell; showy shell	no	$1-$3
regius Sw.	Regal Murex	offshore common	W. Mexico	40%	common	showy shell	no	$1-$5
radix Gm.	Black Murex	offshore common	Panama W. Mexico	40%	common	bin shell	no	$2-$3
elongatus Ltft.	Clavus Murex	offshore uncommon	Phillipines	10%	rare	specimen	no	$15-$35
zamboi Burch	Zambo's Murex	subtidal uncommon	Philippines	20%	rare	specimen	no	$5-$12
enus Columbarium pagoda Less.	Pagoda Murex	offshore common	East Asia	10%	uncommon	bin shell	no	$1-$1.50
enus Drupa grossularia Röd.	Finger Drupe	reefs common	S.W. Pacific	20%	uncommon	bin shell	no	$.30-$.4
uva Röd.	Uva Drupe	intertidal rocks abundant	S.W. Pacific	20%	common	shellcraft	no	$10/gal.
enus Rapana venosa Val.	Red Rapa	subtidal abundant	Japan Medit. Sea	10%	uncommon	bin shell	no	$.50-$1

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amily Coralliophilidae								
enus Rapa								
rapa L.	Paper Rapa	in soft coral common	Philippines	10%	uncommon	specimen; bin shell	no	$.70-$1.50
enus Latiaxis								
nawae G. & P.	Mawe's Latiaxis	offshore uncommon	East Asia	20%	uncommon	specimen	no	$3-$6
pagodus Ad.	Pagoda Latiaxis	offshore common	East Asia	20%	uncommon	specimen	no	$1-$2
amily Buccinidae								
enus Babylonia								
japonica Rve.	Japan Babylonia	offshore abundant	Japan	40%	common	bin shell	no	$.50-$1
areolata Link	Spotted Babylonia	offshore abundant	S.E. Asia	40%	abundant	bin shell	no	$.50-$1
nus Cpeatostoma								
seudodon B.	Hook-spine Whelk	subtidal abundant	W.Central America	10%	uncommon	specimen	no	$.50-$1
nus Cantharus								
ranqurbaricus Gm	Tranquebar Whelk	offshore abundant	India	10%	common	bin shell	no	$.15-$.30
mily Melongenidae								
nus Busycon								
ontrarium Con.	Lightening Whelk	subtidal abundant	Southeast U.S.	90%	abundant	bin shell; souvenir	yes	$.50-$2

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usycon arica Gm.	Knobbed Whelk	subtidal abundant	Eastern U.S.	20%	uncommon	bin shell	yes	$1-$1.50
analiculatum L.	Channeled Whelk	subtidal abundant	Eastern U.S.	20%	common	bin shell	yes/no	$1-$1.50
nus Melongena orona Gm.	Crown Conch	mangroves abundant	Florida	60%	common	bin shell; shellcraft	no	$.25-$.50
nus Syrinx aruanus L.	Australian Trumpet	subtidal uncommon	Australia	30%	uncommon	showy shell	no/yes	$10-$50
nus Pleuroploca giganted Kiener	Florida Horse Conch	offshore common	Southeast U.S.	60%	common	showy shell	no/yes	$5-$20
nus Fasciolaria tulipa L.	Tulip Shell	subtidal common	West Indies	40%	common	bin shell	no	$.70-$1.50
hunteria Perry	Banded Tulip Shell	intertidal abundant	Florida	20%	common	bin shell; shellcraft	no	$.50-$1
mily Olividae								
nus Oliva gibbosa Röd.	Gibbose Olive	subtidal abundant	Indian Ocean	60%	abundant	bin shell; shellcraft	no	$.20-$.30
sericea Röd.	Orange-mouth Olive	subtidal abundant	S.W. Pacific	40%	common	bin shell	no	$.40-$.70
sayana Rav.	Lettered Olive	subtidal abundant	Florida	70%	common	bin shell; shellcraft	no	$.20-$.50

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iva								
spida L.	Ispida Olive	offshore abundant	S.E. Asia	80%	abundant	bir shell; shellcraft	no	$.10-$.20
orphyria L.	Tent Olive	offshore common	W. Mexico	20%	common	bin shell; specimen	no	$2-$5
arneola Gm.	Orange Olive	subtidal abundant	Indo-Pacific	30%	common	bin shell; shellcraft	no	$.10-$.20
nily Turbinellidae								
nus Vasum urbinellus L.	Top Vase	reefs common	Indo-Pacific	50%	common	bin shell	no	$.25-$.50
nus Turbinella ngulata Ltft.	West Indian Chank	subtidal common	Bahamas	20%	common	showy shell	no	$3-$8
yrum L.	Sacred Chank	offshore abundant	India	10%	uncommon	bin shell	no	$2-$3
sinistral)	(Sacred Chank)	rare	India	--	rare	specimen	no	$5,000
nus Tudicla pirillus L.	Tudicla	offshore common	India	20%	abundant	bin shell	no	$.50-$1.50
nus Afer umingii Rve.	Afer Shell	offshore common	Taiwan	5%	common	bin shell	no	$.50-$1
mily Columbellidae								
nus Columbella ercatoria L.	West Indian Dove Shell	intertidal grass abundant	West Indies	80%	abundant	shellcraft	no	$15/gal.

d of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
olumbella ulgurans Lam.	Zebra Dove Shell	intertidal grass abundant	Indo-Pacific	80%	abundant	shellcraft	no	$15/gal.
ersicolor Sby.	Variable Dove Shell	intertidal abundant	Philippines	90%	abundant	shellcraft	no	$10/gal.
nily Nassariidae								
nus Nassarius species	Nassa Mud	mud flats abundant	Indo-Pacific	95%	abundant	shellcraft	no	$10/gal.
nily Mitridae								
nus Vexillum licarium L.	Plicate Miter	reefs abundant	Indo-Pacific	50%	common	bin shell	no	$.20-$.40
ormosense Sby.	Formosa Miter	offshore abundant	Taiwan	20%	common	bin shell	no	$.20-$.40
nus Mitra itra L.	Episcopal Miter	subtidal common	Indo-Pacific	80%	common	bin shell	no	$1-$2
tictica Link	Pontifical Miter	subtidal common	Indo-Pacific	50%	common	bin shell	no	$.50-$1
ardinalis Gm.	Cardinal Miter	subtidal common	Indo-Pacific	20%	uncommon	specimen	no	$1-$1.50
remitarum Röd.	Adusta Miter	intertidal abundant	S.W. Pacific	30%	common	bin shell	no	$.10-$.25
apalis L.	Papal Miter	subtidal common	Indo-Pacific	20%	uncommon	specimen	no	$.50-$1

nd of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
mily Cancellariidae								
nus Cancellaria eticulata L.	Nutmeg Shell	subtidal common	Florida	30%	common	bin shell; shellcraft	no	$.20-$.30
mily Marginellidae								
nus Marginella picinum Mke.	Atlantic Margin Shell	subtidal abundant	Florida West Indies	80%	common	shellcraft	no	--
esjardini M.-M.	Desjardin's Margin Shell	offshore common	West Africa	10%	uncommon	specimen; bin shell	no	$.50-$2
pringlei Tomlin	Pringle's Margin Shell	offshore rare	South Africa	5%	rare	specimen	no	$30-$80
mily Terebridae								
nus Terebra aculata L.	Marlinspike	subtidal common	Indo-Pacific	20%	uncommon	bin shell	no	$1-$2
mily Harpidae								
nus Harpa arpa L.	Common Harp	offshore common	Philippines	60%	common	bin shell	no	$1-$2
amouretta Röd.	Minor Harp	subtidal	Philippines	50%	common	bin shell	no	$.50-$1
costata L.	Imperial Harp	subtidal rare	Mauritius	2%	rare	specimen	no	$100-$300

Kind of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
Harpa major Röd.	Major Harp	subtidal abundant	Indo-Pacific	60%	common	bin shell	no	$1-$2
Family Volutidae								
Genus Melo								
aethiopica L.	Ethiopian Volute	offshore common	S.W. Pacific	60%	uncommon	showy shell	no/yes	$5-$30
melo Ltft.	Indian Volute	offshore common	India	60%	common	showy shell	no/yes	$5-$10
Genus Voluta								
vespertilio L.	Bat Volute	subtidal abundant	S.W. Pacific	80%	abundant	bin shell	no	$.50-$1
nobilis Ltft.	Noble Volute	offshore common	S.E. Asia	30%	common	showy shell	no	$3-$6
imperialis Ltft.	Imperial Volute	offshore common	Philippines	40%	common	showy shell	no	$5-$15
junonia Lam.	Juonia Volute	offshore uncommon	Southeast U.S.	60%	common	bin shell	no	$3-$6
lapponica L.	Lapponica Volute	offshore common	India	20%	common	bin shell	no	$1-$1.50
Family Conidae								
Genus Conus								
amadis Gm.	Amadis Cone	offshore common	Andaman Sea	10%	uncommon	specimen; bin shell	no	$.50-$2

nd of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
Conus renatus Hw.	Sand Cone	subtidal abundant	Indo-Pacific	10%	uncommon	bin shell	no	$.25-$.50
aulicus L.	Courtly Cone	subtidal uncommon	S.W. Pacific	10%	uncommon	specimen	no	$1-$5
betulinus L.	Beech Cone	subtidal common	S.W. Pacific	20%	common	bin shell	no	$1-$2
capitaneus L.	Captain Cone	reefs common	S.W. Pacific	30%	common	bin shell	no	$.25-$.75
coccineus Gm.	Coccine Cone	offshore uncommon	Philippines	20%	uncommon	specimen	no	$2-$3
distans Hw.	Distant Cone	reefs common	S.W. Pacific	30%	common	bin shell	no	$.50-$2
eburneus Hw.	Ebony Cone	subtidal abundant	Indo-Pacific	50%	common	bin shell	no	$.25-$.50
flavidus Lam.	Flavidus Cone	reefs abundant	Indo-Pacific	50%	common	bin shell	no	$.10-$.50
generalis L.	General Cone	subtidal common	S.W. Pacific	20%	common	bin shell	no	$.75-$1.25
geographus L.	Geography Cone	reefs uncommon	S.W. Pacific	20%	uncommon	specimen	no	$3-$8
gloriamaris Ch.	Glory-of-the-Seas	offshore rare	S.W. Pacific	30%	rare	specimen	no	$250-$600
leopardus Rod.	Leopard one	subtidal common	S.W. Pacific	20%	common	bin shell	no	$1-$3
litteratus L.	Lettered Cone	reefs common	Indo-Pacific	50%	common	bin shell	no	$.50-$2

of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
us es L.	Soldier Cone	reefs common	Indo-Pacific	50%	common	bin shell	no	$.25-$.50
rius Hw.	Alphabet Cone	subtidal common	Caribbean Florida	30%	common	bin shell	no	$.25-$.75
tile L.	Textile Cone	reefs common	Indo-Pacific	70%	common	bin shell	no	$1-$1.50
ly Terebridae								
s Terebra ulata L.	Marlinspike	subtidal sand common	Indo-Pacific	70%	common	bin shell	no	$.50-$2
idiata L.	Splendid Auger	subtidal common	Indo-Pacific	20%	uncommon	bin shell	no	$1-$1.50
locata Say	Atlantic Auger	subtidal abundant	Southeast U.S.	80%	abundant	shellcraft; bin shell	no	$.10-$.25
seriata Gray	Triseriate Auger	offshore common	Indo-Pacific	20%	uncommon	specimen	no	$1-$5
ly Turridae								
s Thatcheria abilis Angas	Miraculous Thatcheria	deepwater common	Japan	10%	uncommon	specimen	no	$3-$6
s Turris ylonia L.	Babylon Turrid	offshore common	S.W. Pacific	20%	uncommon	bin shell	no	$1-$2

nd of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
mily Bullidae								
nus Bulla criata Brug.	Atlantic Bubble Shell	intertidal abundant	Caribbean Florida	80%	abundant	shellcraft	no	$5/gal.
VALVIA (CLAMS)								
mily Nuculidae								
nus Nuculana cuta Say	Pointed Nucula Clam	subtidal abundant	Southwest U.S.	50%	abundant	shellcraft	no	$10/gal.
mily Arcidae								
nus Arca ebra Swain	Zebra Ark	subtidal abundant	Caribbean	50%	abundant	bin shell; shellcraft	yes	$.05-$.15
mily Mytilidae								
nus Mytilus dulis L.	Blue Mussel	intertidal abundant	N. Atlantic	20%	abundant	shellcraft	yes	$.01-$.05
pecies clished)	Polished Mussel	intertidal abundant	S.W. Pacific	20%	common	bin shell	no	$.25-$.50
mily Pectinidae								
nus Amusium leuronectes L.	Moon Scallop	offshore abundant	S.W. Pacific	80%	abundant	shellcraft	no	$.10-$.25

Kind of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
Amusium japonicum Gm.	Japanese Moon Scallop	offshore abundant	East Asia	80%	abundant	shellcraft	no	$.10-$.25
Genus Argopecten irradians Lam.	Bay Scallop	subtidal abundant	Eastern U.S.	90%	abundant	shellcraft	yes	$.10-$.20
gibbus L.	Calico Scallop	offshore abundant	Eastern U.S.	80%	abundant	shellcraft; bin shell	yes	$.10-$.20
Genus Nodipecten nodosus L.	Lion's Paw	offshore abundant	Southeast U.S.	40%	common	specimen	yes/no	$2-$10
Genus Chlamys nobilis Rve.	Noble Scallop	offshore abundant	Japan	50%	common	specimen	no	$3-$8
Genus Pecten jacobaeus L.	Pilgrim Scallop	offshore abundant	W. Europe	60%	common	shellcraft; bin shell	yes	$1-$2
Family Spondylidae								
Genus Spondylus americanus Herm.	Atlantic Thorny Oyster	offshore abundant	Caribbean Florida	80%	common	specimen	no	$15-$25
regius L.	Regal Thorny Oyster	offshore common	Philippines Japan	20%	uncommon	specimen	no	$15-$25
Family Lucinidae								
Genus Anodontia alba Link	Buttercup Lucine	offshore abundant	Caribbean Florida	50%	common	shellcraft	no	$.10-$.25

Kind of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
Family Carditidae								
Genus Cardita floridana Conrad	Bird Cardita	subtidal abundant	Florida	50%	abundant	shellcraft	no	$.05-$.10
Family Cardiidae								
Genus Coreulum cardissa L.	Heart Cockle	subtidal abundant	Philippines	80%	common	bin shell; shellcraft	no	$.20-$.30
Genus Cardium costatum	Costate Cockle	offshore abundant	W. Africa	10%	uncommon	specimen	no/yes	$2-$3
Genus Dinocardium robustum Ltft.	Giant Atlantic Cockle	subtidal abundant	Southeast U.S.	80%	common	shellcraft	no	$.20-$.50
Family Tridacnidae								
Genus Hippopus hippopus L.	Bear Paw Clam	subtidal abundant	S.W. Pacific	80%	common	shellcraft; showy shell	no	$3-$6
Genus Tridacna squamosa Lam.	Furbelo Clam	subtidal common	S.W. Pacific	80%	common	showy shell	no	$2-$10
gigas L.	Giant Clam	offshore common	S.W. Pacific	60%	uncommon	showy shell	no/yes	$30-$150
Family Tellinidae								
Genus Tellina radiata L.	Sunrise Tellin	subtidal abundant	West Indies	30%	common	bin shell; shellcraft	no	$.20-$.30

nd of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
ellina era Say	Mera Tellin	intertidal abundant	Florida	30%	common	shellcraft	no	$15/gal.
ineata Turt.	Rose-petal Tellin	subtidal abundant	Florida	30%	common	shellcraft	no	$20/gal.
nus Strigilla arnaria L.	Large Strigella	subtidal abundant	West Indies	20%	common	shellcraft	no	$20/gal.
isiformis L.	Pink Buttercups	subtidal abundant	West Indies	30%	abundant	shellcraft	no	$20/gal.
mily Donacidae								
nus Donax ariabilis Say	Coquina	intertidal abundant	Florida	80%	abundant	shellcraft	no	$10/gal.
enticulatus L.	Caribbean Donax	intertidal abundant	West Indies	40%	common	shellcraft	no	$10/gal.
mily Psammobidae								
nus Asaphis deflorata L.	Gaudy Asaphis	intertidal common	West Indies Florida	20%	common	shellcraft; bin shell	no/yes	$.10-$.15
mily Glossidae								
nus Glossus humanus L.	Oxheart Clam	offshore common	W. Europe	5%	uncommon	specimen	no	$3-$5

nd of Shell	Common Name	Habitat and Abundance in Nature	Geographic Occurrence	Percentage of Shops Carrying the Species	Abundance in Shell Shops	Category of Use	Shellfishery By-product	Retail Price Range
mily Veneridae								
nus Chione ancellata L.	Cross-barred Venus	subtidal abundant	Florida West Indies	80%	common	shellcraft	no	$5/gal.
nus Mercenaria ercenaria L.	Quahog	subtidal abundant	Eastern U.S.	10%	common	jewelry (polished)	yes/no	--
nus Bassina isjecta Perry	Wedding Cake Venus	offshore common	Australia	5%	uncommon	specimen	no	$2-$3
PHALOPODA								
mily Nautiliidae								
nus Nautilus ompilius L.	Chambered Nautilus	offshore abundant	Philippines	80%	common	specimen; bin shell; shellcraft	no/yes	$3-$8
acromphalus Sby.	New Caledonian Nautilus	offshore common	New Caledonia	2%	uncommon	specimen	no	$70
crobiculatus Ltft.	New Guinea	offshore uncommon	New Guinea	1%	rare	specimen	no	$30
mily Argonautidae								
nus Argonauta rgo L.	Paper Nautilus	open sea common	worldwide	2%	uncommon	specimen	no	$5-$15
mily Spirulidae								
nus Spirula spirula L.	Spirula	open sea abundant	worldwide	5%	uncommon	shellcraft	no	--

APPENDIX II

Sample Questionnaire Sent to Florida Shell Dealers

R. TUCKER ABBOTT

P.O. BOX 2255
MELBOURNE, FLORIDA 32901, U.S.A.

April 4, 1980

Dear Shell or Gift Shop Dealer:

I have been asked by an international, non-profit research organization, supported by the World Wildlife Fund, to make an appraisal of the present status of shell collecting and the shell business, mainly in the United States. I have visited and chatted with many of you in Florida, but time and resources lead me to send a short questionnaire to all of you.

The questions are simple and should not take more than a few minutes of your time. Each reply will be handled absolutely anonymously, so please do not identify yourself (unless you wish to do so, of course).

We hope that you will be kind enough to respond. We will send you a copy of the results of the questionaire.

Thanking you in advance, I am

Cordially yours,

R. Tucker Abbott

R. Tucker Abbott, Ph.D.

SECTION 1 - Facts

1. Please indicate the nature of your shell business (check more than one, if necessary).

A.

- ☐ retail shop
- ☐ retail mail order
- ☐ wholesale

B.

- ☐ bin or commercial shells
- ☐ shellcraft novelties, jewelry
- ☐ shell collector items
- ☐ other non-shell items
- ☐ shell books

2. How many years have you or your company been in business _____?

3. How many employees do you have? 1. During your busy season_____?

2. During your off season _____?

4. What are your busiest seasons?

☐ Winter ☐ Spring ☐ Summer ☐ Fall ☐ All

5. How do you obtain your shells? Please give approximate percentages

From overseas in bulk _____%

From wholesalers in U.S. _____%

From local collectors _____%

By overseas parcel post _____%

By exchange _____%

6. What countries do your shells come from? Please indicate by number which areas are first, second, third, etc.

- ☐ Don't know
- ☐ Philippines
- ☐ India
- ☐ Haiti
- ☐ East Africa
- ☐ Taiwan
- ☐ Japan
- ☐ Mexico
- ☐ Florida
- ☐ _____

7. Where do you sell your shells? Please give rough percentages.

Within Florida _____%

Elsewhere in the U.S. _____%

Overseas _____%

4. If it could be proven by responsible biologists that certain kinds of shells were seriously endangered for any reason would you approve of some sort of control (overseas or locally) or ban?

5. There is now a Florida law against collecting for sale Florida corals. Would you approve of a law against importing foreign corals, if it could be proved that coral reefs might be eventually eliminated by over-collecting?

6. In the general trend of public buying of shells in the last few years, do you see:

☐ an increase in interest ☐ a decrease

☐ about the same ☐ don't know

7. We see relatively few Florida, (as against foreign), shells in shell stores. What are some of the reasons?

☐ labor too difficult ☐ supplies in nature have been dwindling

☐ prices too high ☐ not carried by wholesalers

8. How many shell dealers (wholesalers, mail order retailers, and retail shops dealing mainly with shells) do you think there are in Florida? (We will let you know almost exactly how many there are). Check one:

☐ 1,000; ☐ 500; ☐ 200; ☐ 100 or fewer.

9. Please make a guess as to the number of other shops, hotel gift shops, supermarkets, drugstores, gift shops, jewelers, etc. that sell some form of shells in Florida.

10. In your opinion, do you think the world supply of shells is almost inexhaustible (barring a great ecologic catastrophe)?

☐ yes ☐ probably ☐ maybe ☐ no ☐ no opinion

8. If you sell souvenir items made of shells, such as animals, plant holders, paper weights, etc., what percentage are made overseas _____%, locally or in your establishment _____%. In some other place in the U.S._____% Don't know _____%.

9. If you sell jewelry, what percentage is made in the U.S._____% overseas_____% Don't know _____%.

10. Do you find that the present supply of shells (either from overseas, from wholesalers or from local collectors) is adequate to fill your needs?

☐yes; ☐no; ☐varies, but generally is adequate?

11. What percentage of sea products that you sell are shells _____% corals _____%; other sea life _____%.

12. Please make a rough guess as to the percentage of the shells you deal in that are by-products of shellfishery food activities (such as scallop shells, abalones, pink conchs, mussels, etc.)

☐less than 10% ☐about 50% ☐more than 50% ☐don't know

SECTION 2 - OPINIONS

These are questions which require subjective and personal answers. If you wish to elaborate on any subject, please feel free to add more details. You may also answer with a "no comment", if you wish.

1. Do you ever see any changes or trends in the buying habits of your shell purchasers?

2. In the last few years, what have been the three or four most popular selling species of shells?

3. If the population of shells in nature shows a permanent decrease in number, check the main reasons that you think might be responsible.

☐pollution

☐over-collecting

☐don't know

☐disturbance of the habitat

☐predators, such as fish, crabs, disease.

APPENDIX III

FLORIDA STATE LAWS

QUEEN CONCHS (1971)

370.113 Queen conchs of the species Strombus gigas; regulation.—

(1) It is unlawful for any person to take from any salt, fresh, or tidal waters of this state more than 10 queen conchs of the species *Strombus gigas* in any calendar day, or to have in his possession at any time more than 20 such conchs.

(2) It is unlawful for any wholesale or retail fish dealer to have in his possession, to offer to purchase, purchase, to offer to sell, sell, barter or transport for sale any queen conchs of the species *Strombus gigas* for purposes other than for use as food.

(3) The provisions of subsections (1) and (2) shall not be applicable to any species of queen conchs imported from another country.

(4) Any person, firm, or corporation violating the provisions of this act shall be guilty of a misdemeanor of the second degree, punishable as provided in § 775.082 or § 775.083.

History.—§ 1, ch. 65-488; § 1, ch. 69-223; § 288, ch. 71-136.

CORALS (1976)

370.114 Taking of marine corals and sea fans regulated; penalties.—

(1) It is unlawful for any person, as defined in § 1.01:

(a) To take, attempt to take, or otherwise destroy, or to sell or attempt to sell, any sea fan of the species *Gorgonia flabellum* or of the species *Gorgonia ventallina* or any hard or stony coral *(Scleractinia)* or any fire coral *(Millepora)*; or

(b) To possess any fresh, uncleaned, or uncured sea fan of the species *Gorgonia flabellum* or of the species *Gorgonia ventalina* or any fresh, uncleaned, or uncured hard or stony coral *(Scleractinia)* or any fresh, uncleaned, or uncured fire coral *(Millepora)*;

unless it can be proven by certified invoice that the sea fan or coral was imported from a foreign country or unless it can be proven that the sea fan or coral was lawfully taken before July 1, 1976.

(2) This section shall not apply to any sea fan or coral taken for scientific or educational purposes when the taking is approved and permitted by the department.

(3) It is unlawful to take coral from, or possess it in, the John Pennekamp Coral Reef State Park. The provisions of § 592.17 shall be in addition to the provisions of this subsection.

(4) A person who violates any provision of this section is guilty of a misdemeanor of the second degree, punishable as provided in § 775.082 or § 775.083.

History.—§ § 1-3, ch. 73-145; § 1, ch. 74-214; § 1, ch. 75-38; § 1, ch. 76-30.